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HEALTH AND BEAUTY.

AN

EXPLANATION OF THE LAWS

OF

GROWTH AND EXERCISE;

THROUGH WHICH A PLEASING CONTOUR, SYMMETRY
OF FORM, AND GRACEFUL CARRIAGE OF THE
BODY ARE ACQUIRED.

AND

THE COMMON DEFORMITIES OF THE
SPINE AND CHEST PREVENTED.

BY JOHN BELL, M. D.

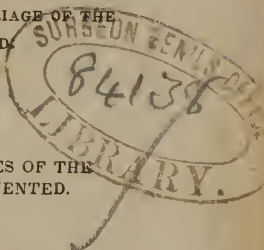
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HEALTH AND BEAUTY.

CHAPTER I.

THE STUDY OF BEAUTY—THE SKIN.

THAT beauty of person is synonymous with health and perfect organisation, is an opinion to which, with some qualifications, we must give our assent. Shall we not go farther, and admit, “that ideas of goodness, of suitableness, of sympathy, of progressive perfection, and of mutual happiness, are, by an intimate and inevitable association, connected with the first impression made by the sight of beauty.”

The importance of an inquiry into, and of a full examination of, this subject is obvious. Man was created after the image of his Maker: and, surely, it is the duty of his descendants in all after times to strive to preserve the type free from disfiguration. The study of Beauty, in its causes and supports, is not only a fit, but, also, an elevating and purifying one. The Grecian artist studied the hu-

man shape for his conceptions of the divine. Intent upon the natural, he ascended to the ideal. This same intentness, this admiration of beauty inspired the Italian artists with their finest conceptions, as we see in those images of loveliness and grace, the inimitable productions of a Rafael and a Guido. Hence, it has been observed, that the great models of ideal beauty please us, not merely because their forms are disposed and combined so as to affect agreeably the organ of sight; but because their exterior appears to correspond with admirable qualities, and to announce an elevation in the condition of humanity. We need not wonder, then, that the Greeks should have made beauty an object of worship, and placed it immediately after virtue, in the order of their affections.—Refined and spiritualised in the discourses of Plato, described with all its moving attitudes to charm and enliven in the verses of Homer and his successors, beauty, when embodied in marble, by the skill of Phidias, still retained its poetical grace with perfect purity of expression.—The philosopher could calmly contemplate the work of the artist, as representing his own abstractions; the poet gaze on it as a realisation of his imaginative musings; and the moralist admire the combination of bodily grace and harmonious proportion with the image of mildness of disposition and maiden purity of thought. That this is no fanciful speculation, each of us can prove, by

looking at that statue of the goddess of Love and Beauty which enchants the world; and in whose presence we inhale the ambrosial respect, which, beheld, instils

“ Part of its immortality; the veil
Of Heaven is half undrawn; within the pale
We stand, and in that form and face behold
What mind can make, when Nature's self would fail.”

Greatly shall we err, if we indulge in a not uncommon notion, that the study and admiration of beauty are unfavorable to vigor of thought and philosophical research, or are opposed to whatever is useful in the every day concerns of life.—The Athenians, the people most celebrated for heroic deeds, amongst whom Socrates taught and practised wisdom, who extended farthest at the time, and by a successful exercise of the nobler faculties of our nature have perpetuated, the fame of Greece, were the most enthusiastic worshippers of beauty.—This worship they continued amidst the contests of a fierce democracy—a worship revived in modern times by a people, the Florentines, whose blended aspirations were for liberty and high art. The Spartans, distinguished as they were by an austere and unpolished gravity, did not neglect the cultivation of bodily address and equable vigor and energy—nor withhold their reverence for beauty, though

less adorned by grace, and less animated by enlivening dance and song, than amongst their more imaginative and tasteful rivals of Athens.—In this latter, more peculiarly, were men made to feel their individual importance, and to move and speak and act with an ease, so readily acquired as to seem innate, and a conscious dignity, which furnished admirable models for the artist, himself participating in the same feelings, and influenced by the same causes with themselves.

In the public games and gymnastic exercises, the manly form, here naturally of fine proportions, uncumbered and uncramped by excess of drapery, was exhibited in all the varied postures and attitudes, which strength and address, skill and grace could suggest, in the contests of the *athletæ* and the chariot race, alternating with the recitations of historians, and the musical reading of rival poets.

Their festivals displayed the pomp and ceremonies of religion, in all that was venerable in age, and graceful and lovely in youth.—On these occasions, the other sex appeared in processions, decorated with flowers and dressed in a light and flowing drapery, which, whilst it allowed of a display of the figure in the various evolutions demanded on the occasion, left no room for the censure that might attach to the, occasionally, almost nude exhibitions by their fathers, brothers, and lovers, at the games and the *gymnasia*.—The dramatic exhibitions of the

Athenians were representations of the sufferings and exploits of heroes and of demigods, with interludes of the mazes of the dance, and the harmonies of song.—In all these, the artists found the personifications of glory, honor, suffering, and crime; of beauty, grace, innocence, and simplicity. Borrowing from poetry and tradition the conceptions of heroism and deity, they subsequently furnished, in return, subjects calculated to excite the glow of enthusiasm; and conveyed moral sentiments in agreeable images.—Their productions, at first copies of the most beautiful and graceful individual figures and pleasingly contrasted groups, became, in after times, models for the disposition and arrangement of the public ceremonies and dances.—We learn, therefore, with the less surprise, that, at one time, the youthful Greek frequented equally the schools of philosophy and the workshop of the artist; and that even Plato applied himself to the sciences and the arts of design at the same time, in order to obtain, with a knowledge of the good and the true, that of the beautiful.

The sense of the beautiful, like the sense of moral right, is innate; but the former, like the latter, will be either greatly perverted, or rendered more delicate and observant by the extrinsic circumstances of education and associations.—Its proper cultivation will be found to contribute largely to personal comeliness and comfort as well as to social pleasure, and to administer to, and be in turn

strengthened by, well regulated feelings and intellect. The rules for the preservation of beauty are based on a knowledge of the proportions of the human frame, and of its several organs, and of the means best calculated to preserve the entireness of each, and its appropriate connection and sympathy with all the others. These are, precisely, the same rules to be followed for the support of health, which includes both physical and intellectual well being. They are in entire harmony, moreover, with those by which each individual is required to maintain his ethical and religious relations with his fellow men.

The study of the parts, proportions, relations, and harmonies, of one object with another, and with the rest of the universe, constitutes a branch of philosophy. How truly philosophical, must be the study of the noblest object in nature, man himself, who is, we are told, but a little lower than the angels, and with whom he is allowed to entertain hopes of holding fellowship hereafter.—It will be found to be one of the best correctives to pruriency of imagination, and aid to soberness of thought. By purifying the taste, it furnishes a direct and ready auxiliary to religious restraints against the debasing influences and connections to which the impulse of passion might otherwise prompt.

Were a knowledge of the outlines, proportions, and symmetry of the human form, and of the natu-

ral attitudes and appropriate gestures as general as it might readily be made, exercise would be determined by the requisite considerations of health and grace; and the subject of clothing be studied in reference to its true purposes—protection against atmospherical vicissitudes and a tasteful adornment of the person.—Decency would no longer be determined by fashion, nor would the approved costume of the day be at variance with personal comfort and ease of carriage, as it so commonly is, in all its successive mutations.—In place of the fantastic figures, called fashionably dressed persons, moving in a constrained and artificial manner, we should see them, and especially the fairer part of creation, arrayed in vestments adapted to their size, shape, and undulating outline of form, and with draperies, which should flow in graceful folds, adding to the effect of, without impeding, elasticity of step and the varied movements of the limbs.

It may be alleged, that beauty is not made by rules of art, nor is health the result of dietetic maxims. This is unquestionably true. But the converse of the proposition will not apply, viz: that nature alone is the guide. If we rightly understood, and, understanding, would follow the *laws* of nature, our kind mother, we should not err.—But her dicta, as now construed, are of import as equivocal as ever were the Delphic oracles of old. He, who yields to every momentary impulse of personal gratifica-

tion, claims to follow nature; forgetting, that a fellow being, whose appetites run counter to his, may fairly urge his own construction; and thus, every man alleging that he is the interpreter, we should have a chaos in taste and morals, and see confusion worse confounded.

It is the part of a cautious observer, unbiassed by individual caprices and wayward impulses, to note and record the succession of movements and changes, which may be said to constitute events, in the human body, from birth to death; and to study carefully the modifications produced by all the external agencies to which it is subjected. The result of observations thus cautiously and honestly made proves, that there are laws, part of the general ones of nature, to which man is subjected, as fixedly, despite his false philosophy and perverse fashions, as are the planets to the laws of attraction and repulsion by which they move and are kept in their orbits. He cannot break through, with impunity, the laws of human nature, by abuses and excesses, no matter whether the motive be pure or vicious, more than he could interrupt those of general nature, by trying to arrest the earth in its course, or make it submit to oscillatory retarding movements. A person, who, without prior training of his vocal organs, or whose lungs have suffered from recent disease, should indulge in loud and protracted speech, or vociferation, will, assuredly, pay the penalty for such rashness;

whether he were addressing his congregation from the pulpit, yielding to mimic passion on the stage, or affecting the patriot, eager for his country's weal, at the election ground and in the legislative hall. The contents of the intoxicating bowl will be, alike perilous to him, who believes that he is drinking the elixir of life, as to his companion, who knows that he is taking the bane of his peace, the stupefier of his senses, and the degrader of his intellect.

To the same natural laws equal obedience must be paid by the pious missionary, who visits foreign and remote lands, to spread the truths of revelation, as by the needy adventurer athirst for gold and a slave to avarice. The noon day sun will burn with equal fierceness, the midnight dews equally chill, and the pestiferous exhalations poison to the very springs of life, both the herald of peace and the lawless freebooter.—An infraction of these laws by the child of poverty, doomed to bodily efforts and labor beyond its strength, and by the daughter of affluence, who is prevented from the free exercise of her body, will be followed, in both, by the penalty of premature feebleness and early deformity. Beauty, herself, enshrined though she be in all hearts, and allowed to play the tyrant over them all, must yield graceful submission to those laws on which her existence and her empire depend.—To enumerate and elucidate them, will be my endeavor in the present work.

In the consideration of beauty, we must include grace, the often nameless charm, which mere regularity of features and of form are insufficient to impart. Our admiration is not confined to the cheek, suffused with celestial red, love's proper hue, nor to the eyes with their liquid lustre, nor to the vermeil lips and ivory teeth. It extends to the play of features, the expression of the soul through the face; the easy attitude, and graceful movements of the whole body, under the guidance of kindly feelings and a refined intellect.

I shall speak of the attributes of beauty, under the heads of complexion and color of the skin, its polish and softness; rounded outline and distinct contour of the body and limbs; attitude and movements; and finally expression.—After this, I propose to make a few observations on the different styles of beauty, with reference to their characteristic peculiarities and causes.

THE SKIN.

The skin is the seat of touch, the most important of our senses, and, so far, it is connected with sensation and mind. It is, also, one of those organs, the function of which is so necessary to health, that any impediment exerts a marked sinister influence over all the internal organs of the body. In this latter point of view, the skin is ancillary to the lungs, in

their respiratory office; since, like these, it gives out a watery vapor, oftentimes converted into a fluid, and gases, the chief of which is carbonic acid. It, also, absorbs air, or rather the gases, of which the atmospherical air is compounded, and of these, mainly oxygen, the supporter of life in all animated beings, and which is introduced into the blood, either through the lungs and skin, or, in some of the inferior animals, through the skin alone. For this part to perform its functions well, requires the admission to it of fresh air and light; and the circulation through it of red and healthy blood.

The freshness of color of the skin of our race depends mainly on the blood which so abundantly circulates through it. This fluid is distributed at the surface of the body, by means of a delicate interweaving of small vessels, or tubes, so numerous as to cover every point. Of this fact, we all have familiar proof in blood flowing, after the introduction of the finest needle into any part of the skin. This net-work of vessels, with which are also interwoven filaments of nerves to serve for the sense of touch, rests on a soft and elastic tissue beneath, called fat; and is covered above, by a horny membrane, called scarf-skin, which is diaphanous. The whiteness of the skin depends directly on this fat beneath; and on this ground, as we may call it, of the coloring above, will depend the modifica-

tions of tint, communicated by the blood, in the minute vessels of the skin. Whoever has seen and felt, and who has not so experienced, the suffused red, and at times, crimson of the cheeks, and even entire face, under the quick feeling of bashfulness, shame, joy, or transient anger, as well as after active bodily exercise; and the contrasted pallor from fear, fainting, and exhausting losses of blood, can well appreciate the coloring agency of this vital fluid which circulates, in the first examples, with rapidity and in increased quantity, and, in the latter, abandons the skin and is abstracted from the system.

I have said that the sanguineous net-work of exceedingly small and innumerable vessels of the true skin, is covered with a diaphanous lamina called scarf-skin. I should add, that, under this latter and between it and the true skin, is spread a semigelatinous or mucous layer, which serves, in conjunction with the scarf-skin or horny lamina, to obtund the impression of external bodies, and to prevent continued suffering from the exercise of the sense of touch. The greater thickness and the black color of this intermediate substance constitute one of the distinctive marks of the African or Negro race proper. It requires no knowledge of anatomy to make one, who has suffered from or seen the slightest vesication of the skin, understand the arrangement of parts which I have just described. The outer or scarf-skin is raised up, and contains some fluid: on the

first being removed, and the latter discharged, the highly red and true skin is seen with a slight mucous or semigelatinous matter imperfectly spread over it. The red color of the true skin, therefore, every where existing, will be seen in proportion to the thinness of the outer or scarf-skin and the smallness of quantity of the intermediate mucous layer. This is the case in parts of the face, and notably the cheeks, and still more the lips, which have only an exceedingly thin pellucid membrane, external to the red true skin beneath. We may mention, also, the tips of the fingers and nails. But, although the actual red or rather roseate color be visible only at the parts of the skin just described, it is not the less true that the healthy tone, as colorists would term it, of the whole external surface results from a regular circulation, and abundant supply of pure blood, in it. The whiteness of skin so much admired, especially by the ancients, would soon be converted into chalky or clayey color, if there be irregularity or deficiency of supply of the blood beneath, as in the case of any disorder of the system at large.

There is another arrangement of structure, imbedded in the scarf-skin. It is the numerous small follicles, called sebaceous, in which is formed an oleaginous matter, that contributes greatly to the softness and smoothness of the skin. These follicles or glands abound in some parts of the surface of the

body as in the arm-pits, &c. The matter given out from them communicates that peculiar odor to the animal body, which is most manifest after exercise, and often fixedly so, where the rules of cleanliness, in suitable ablutions and changes of raiment, have been neglected. The appearance exhibited in the globules of water on the surface of the skin, after coming out of the bath, is caused by the oleaginous fluid, which repels the water.

In reference to the color of the face, it may be observed, that the forehead, the temples, the eyelids, the nose, the upper part of the superior lip, and the lower part of the inferior one, ought, in woman, to be of a beautiful and rather opaque white. The approach to the cheeks, and the middle of the chin, ought to have a slight tint of rose color, and the middle of the cheeks be altogether rosy, but of a delicate hue. Cheeks of an animated white are thought preferable to those of a red color, although less beautiful than those of a rosy hue. Let me repeat, however, that, without a healthy circulation of the blood, which implies in it, a healthy respiration, and action of the lungs, none of these characteristics can be retained. Another condition for the skin's acquiring a natural, it may be called the true color and hue of health, is its exposure to light. From erroneous notions, and fears of this agent, ladies often excuse themselves from going out in the open air, especially during the summer months—

forgetting that all that is rich and variegated in the bloom of vegetable and animal nature, in the flowers of the field, and the birds of the air, is owing to light. Deprive a plant of this genial influence, the green color of its leaves is gone; and we no longer see the beautiful varied hues and tints which win admiration for its flowers. The individuals of our own species deprived of light, as when resident in underground apartments, and in prisons, and factories, become blanched, wan, and sickly, in their complexion. When I say blanched, I mean rather the absence of all hue of health than the acquirement of a natural or clear white color. The ground of the skin in this case is that which would be imparted by potter's clay.

Though color is spoken of, as an evidence of a healthy state of the skin, and an effect of the free transmission of pure and florid blood, its acquisition is far from being the only object and use of the regular circulation of this vital fluid through the cutaneous tissues. From the blood are made, by a process termed secretion, the gases and fluids already adverted to, the regular discharge of which is a necessary operation, both for the health of the skin and of the internal organs of the body.

Perspiration. The chief secreted fluid from the skin, is that of perspiration—which is either sensible or insensible. The first is a moisture or fluid,

commonly called sweat. The second is a vapor, which is generally invisible, and which is constantly being exhaled. It is more abundant, and gives rise to a greater diminution of matter from the body, than sensible perspiration or sweat. Its escape from the surface of the body is easily shown, by the inclosing of the hand and arm in a glass jar, and carefully excluding the atmospheric air. The inner surface of the glass, soon becomes covered with moisture. If the tips of the fingers, of their natural warmth, be held very near to, but not touching, a glass mirror, or any polished metallie surface, this is soon dimmed with a vapor, which condenses upon it in small drops.

Sensible perspiration, or sweat, is formed in a more active state of the circulation through the skin than the insensible; as we see in its being so largely given out after active muscular exercise, in which the blood is brought in increased quantity to the surface of the body; and, also, after immersion in water of a high temperature. There is a certain point, however, below which sweating does not take place, and insensible perspiration is very inconsiderable; and above which the former ceases, and the latter goes on with great activity. The first of these states is that in which the skin is pale and cold, and its circulation languid; the second is where the skin is red, and with an excess of blood in it, as in cases of fever. It is often sufficient, in

circumstances in which the skin is hot, red and dry, to apply cool air, or cold water by immersion of the entire body, or by sponging the surface, in order to convert the insensible into sensible perspiration, and to bring on a profuse sweat.

The principal ingredient in the fluid of perspiration is water, with the addition of some saline substances, an acid, a modification of the acetic, or that which constitutes vinegar, some animal matter, and an oily or fatty substance which comes from the sebaceous follicles already mentioned.

In addition to the fluid and vapor of perspiration, carbonic acid is given off from the skin. The same experiment, by which the exhaled vapor from the skin of the arm is demonstrated in the glass jar, will serve to procure the carbonic acid, which is given out at the same time.

The removal from the surface of the body of the fluid formed on it, is accomplished by the process of evaporation, in which a liquid is converted into a vapor by the addition of heat. The effect is a coolness or coldness, and a reduction of the thermometer—perceptible enough if this instrument be held on the skin when it is moistened with sweat and exposed to air, so that evaporation shall go on rapidly.

Perspiration is, then, a means for cooling the body, and enabling it to bear those extremes of heat, either solar or induced by artificial means, which,

without this provision, would inflame the skin, and excite the system to an alarming and even destructive extent.

But, although the simple aqueous portion of the sweat may be removed by evaporation, and by its being imbibed by an inner garment, yet the saline and animal matters will remain adherent to the skin, and irritate it and impede its function, unless they be removed by regular ablution.

I shall now point out the conditions on which the vitalising fluid, the blood, acquires its coloring property, and at the same time, the power of nourishing all parts of the animal frame, as well as of furnishing the materials for perspiration, and all the other necessary secretions.

Allusion has been already made to the fact, that the atmospheric air is not elementary, but consists of different gases, viz: oxygen twenty-one per cent., azote or nitrogen seventy-nine per cent., and carbonic acid or fixed air, not quite one per cent.

Respiration. There are two varieties of blood circulating in the living human body—one, in the veins, of a dark color; another, in the arteries, of a florid red. The first, or the venous blood, is that which is returned from all the organs and tissues of the body, flows towards the heart and is finally poured into the two cavities of its right or anterior side. The second, or the arterial blood, goes from

the cavities of the left, or somewhat posterior side of the heart, and is distributed to every portion of the body. Before the dark blood, which is in the right cavities of the heart, can reach the left, it must pass through the lungs; and before the scarlet blood of the left cavities can reach the right ones it must traverse all parts of the animal frame. In its passage through the lungs, from the right to the left side of the heart, the blood acquires its florid color and other properties. In its course through the body at large, by the time it reaches the intimate structure and tissues of the organs, it has become dark, with, also, a change or loss of some of its properties. By what means does the blood of the right cavities, and of the vessels or cylindrical tubes by which it is conveyed into the lungs, become, when in these organs, of a bright red, and thus changed, is sent from the left cavities of the heart. This may be readily understood. The lungs are spongy and elastic organs which fill up the cavity of the chest, and inclose the heart between them. They are hollow, and habitually distended with air, which finds entrance through the windpipe. This tube, beginning at the back part of the mouth, and before the passage which leads into the stomach, goes down in front of the neck; and on entering the cavity of the chest, at the spot corresponding nearly with the beginning of the breast bone, it divides into two, and these tubes again sub-

divide, until every part of the lungs is penetrated by them, on to their terminations in air cells, which are as minute as drops of water. The interior of all these ramified tubes, and indeed the whole cavity of the lungs, is lined by a smooth and thin membrane, the extent of surface of which is said to be greater than that of the skin itself; it being estimated at twenty thousand square inches. It now remains to show what part, this membrane of the lungs, constantly exposed to the air in the cavity which is lined by it, performs in changing the color of the blood.

This fluid, which reaches the lungs from the right side of the heart, of a dark color and unfitted to nourish and preserve life, is distributed by a net-work of very fine, and innumerable vessels, under the lining membrane, and is acted on by the air through this latter. The consequence of the action of the air in the pulmonary cavity on the blood, is its prompt and entire conversion into a fluid of a bright red color, and its acquisition of properties by which it is fitted to nourish and to vivify every part of the animal economy. Thus changed, it returns from the lungs, by another set of vessels, and is conveyed to the cavities of the left side of the heart—by whose strong muscular sides, it is propelled into the great canal, or great artery, and by which, and its divisions, and minute ramifications it is distributed to every, the minutest portion of the human body, and of course, in abundance.

to the skin. It is this red, purified and nutritive fluid which imparts the color of the rose and the carnation to the cheeks, lustre to the eye, and animation to all the senses. After it has reached every tissue, and performed its requisite office, in vessels so small as not to be visible to the naked eye, the blood loses its florid color at the moment of its passing into another set of vessels, the veins, which are, also exceedingly small.—These gradually unite into larger ones, until all the returning and now dark blood of the body is poured by one great vein into the right cavities of the heart, whence it pursues the course or round of the circulation already described.

It will, perhaps, be asked, whether the change in the color and other properties of the blood circulating through the lungs, consequent on its exposure to the atmospheric air introduced in the windpipe, be accompanied or attended by any alteration in the properties of the air inhaled. The affirmative answer opens to our view, truths of the most vital bearing on health and beauty. In exchange for the pure air, which entered the lungs by inspiration, or the effort of drawing in the air by a raising and expansion of the chest, there goes out by expiration or breathing out of their contents, with a fall of the chest, an impure air, consisting of much watery vapor, and a gas similar to that which was given out from the skin and called carbonic acid. This gas

is evolved, also, in the process of fermentation; as in the vats of a brewery, and in the burning of charcoal, and, also, of limestone for the purpose of procuring lime: it is found at the lower part of old wells, and is sometimes given out from the surface of the ground, as in the Grotto del Cane near Naples. It is destructive to life, when inhaled alone for a short time, as we all have heard, if not witnessed, in the instances of persons sleeping in a room, or between the decks of a vessel, in which charcoal had been burned, or was burning, and no ventilation procured by the escape of this gas and the introduction of the outer air. Its retention or that of its material element in the blood, in place of its being given out in breathing, will prevent this fluid from acquiring its proper redness; and it remains dark and unfitted for giving healthy color and nutrition to the body. The lips, far from exhibiting their coral hue, are livid, and the cheeks of a dark bronzed or leaden aspect.

It has been found, that the air of the atmosphere, which was taken into the lungs in breathing, loses a great deal of that element or the oxygen, on which its salutary properties for the support of life depends. It is this element or the oxygen, which enters the blood vessels through the lining membrane of the lungs, and imparts to the blood, a bright or florid red, and those other properties already mentioned.

Hence, we learn, that the process of respiration

is productive of the imbibition and entrance into the blood of the vitalising and coloring stimulant of oxygen, and of the removal from it of the sedative, deteriorating, discoloring and deadening agent, carbonic acid gas. With the first we are familiar, in the change of color which takes place in the blood drawn from a vein. From dark, as it is when flowing from the vein and immediately on its being received into a vessel, it becomes, at least, that part on the surface exposed to the atmospheric air, of a bright red. Just such a conversion of dark into bright is performed in the blood, as it flows through the lungs in minute vessels under the lining membrane of the windpipe and its ramifications.

I would repeat, in a summary manner, that the blood which reaches one side of the heart, from all parts of the body, is dark and unfitted to nourish and vivify, and cannot be carried again to the organs until it passes through the lungs, and is exposed to the air, and then reaches the other side of the heart.

Assuming, as near the truth, that there are twelve pints of air constantly in the cavity of the lungs—for these can never be emptied, no matter how complete the expiration, there is introduced by inspiration, every minute, nearly eighteen pints of air, and in the space of twenty-four hours upwards of fifty-seven hogsheads of air.

The blood sent from the heart, and exposed to this quantity of air flows through the lungs, in the

quantity of eight pints every minute, and about twenty-four hogsheads in the twenty-four hours.

When we have been apprised, that at each inspiration fresh air is taken into the lungs, and at each expiration, impure and altered air is given out; and that these two movements which constitute the act of respiration are repeated every three seconds, or eighteen times in a minute, we can the better understand how readily and constantly the air around us is deteriorated by our breathing, and how indispensably necessary it is to have, regularly, a supply of that which is fresh and pure.

The quantity of oxygen, or of the vital element of the air, which is consumed and appropriated in the lungs by respiration and the wants of the animal economy through this channel, is, on an average, forty-five thousand, seven hundred cubic inches in twenty-four hours. The quantity of carbonic acid generated, and given out from the lungs in respiration, during the same time, is rather more than thirty-eight thousand cubic inches.

To make, now, the application. In order that we should breathe freely, and with the desired healthy result, the chest must be allowed its full expansion, so that it shall inhale or draw in as much air as the lungs can readily hold; and secondly, the air itself must be pure. Unless these requisites be complied with, the blood neither entirely nor completely acquires the color which gives the dye of beau-

ty—nor its other properties on which the growth and strength, and ready movements of all the organs depend. What cruel injustice, then, do they commit on themselves, who so compress by tight lacing their chests, that often these cannot be distended to half their proper dimensions; and who, at the same time, inhale, day after day, in close rooms, an air imperfectly renewed; with perhaps a change from bad to worse, by inhaling a vitiated air, in crowded assemblages, to a late hour in the night.

Badly do they attempt to atone for these deficiencies by hurried movements of the chest or panting respiration. The lungs are not expanded—air does not reach all parts of their lining membrane; the blood beneath this latter is not changed, or is so imperfectly. The complexion is lost, or becomes sallow, with a change, occasionally, to a purple flush; and the faculties of the mind are oppressed by the accompanying disturbance in the circulation of the brain. There is an air of languor and lassitude, if not of suffering, and an absence of that expression of countenance, which, when it speaks cheerfulness and mind, simulates, if it is not actually, beauty. Nor is it necessary that fashion or folly should be the impelling motive, under which persons with compressed waists and chests crowd together, and inhale over and over again an impure air. But not alone will the frequenter of the dancing room and the theatre be the sufferer. They on pious work intent, who con-

gregate in churches, where ventilation is neglected, will be equally victims, both in their appearance and their health. The Deity makes no exceptions, in the operation of his general laws, to suit the whim or the custom of any individual, or class of persons. All our moral duties can, happily, be performed without transgressing the laws of our physical nature. The discords to the universal harmony are of our own creation, and not in the nature of things.

We learn that there are two causes of disorder and even death, from persons breathing over and over again the same air, without renewal, or with an imperfect supply of fresh air. The first is in the diminution of the vital and coloring element, oxygen; the second, in the application to the lungs of a positively deleterious agency, or the carbonic acid gas, that which is given out from the lungs in respiration. Death generally occurs from this last cause, long before the air is exhausted of its oxygen. For, it has been ascertained, that not more than a fourth of the quantity of the air taken in the lungs at any time is decomposed—the remainder is given out unchanged. Many of my readers have, no doubt, heard of a fact in the history of English settlement and conquest in India, strongly illustrative of the destructive effects of a vitiated air, or of the deficient supply of that which is pure. In 1756, the members of the factory

at Fort George, one hundred and forty-six in number, were taken prisoners by the Viceroy of Bengal, Sur raja al Dowlat, and confined during the night until he should determine how to dispose of them. Their dungeon, since called the Black Hole of Calcutta, was eighteen feet square, in which two very small windows were the only apertures for the admission of air from without; and as they were both on the same side, ventilation was impossible. Hardly was the door closed on the prisoners, when their sufferings commenced, and in a short time, a delirious and mortal struggle ensued to get near the windows. At the end of six hours, ninety-six were relieved by death. In the morning when the door was opened, twenty-three only were found alive, many of whom were subsequently cut off by what has been termed putrid or malignant fever, caused by the dreadful effluvia and the corruption of the air.

Such an awful example ought not to be lost sight of; nor should it be forgotten, that there is a slow poisoning, perhaps more torturing than the sudden and violent kind. In our school rooms, churches, hospitals, and places of public evening amusements, and in our private dormitories, we not unfrequently make near approaches to the summary poisoning process of the Black Hole of Calcutta. In these places, the pure element of the air is exhausted; and there is an exhalation both from the skin and the lungs of the poisonous agent, carbonic acid, which, when

breathed for a while, produces necessarily the effects already mentioned. Young and delicate females, confined, hour after hour, in a close and badly ventilated school room, inevitably show, in their languid looks and pale if not sallow complexions, the wrong done to their health and their beauty—a wrong aggravated beyond measure, by the absurd fashion of tight lacing, and the cruel deprivation of suitable supports to their wearied bodies, when seated.

Of the extent to which females allow the absurdities of fashion to conflict with the plain conditions for healthy respiration, and consequently, healthy coloration, we have too many lamentable examples. One needs not to be either physician or confessor, to discover this fact. The freedom of exhalation corresponding with that of inhalation, the differences in the former will give us a tolerably fair criterion of the latter. In ten females, free from disease, about eighteen or nineteen years of age, the quantity of air inspired, as well as that given out at each expiration, averaged about three and a half pints; while in young men, of the same age, it was found to amount to six pints—an alarming contrast, even after due allowance is made for any natural difference of capacity of chest in the two sexes. How much greater, how enormous the evil! where the regular movements of the chest are rendered almost impossible by the extreme tightness of bands and lacing, which

may be truly called the fetters and chains of beauty. But what a deliberate cruelty is committed by parents, when the practice is begun on their children, before the chest has acquired its proper and relative capacity.

The above calculations apply to a voluntary, full inspiration. The greatest volume of air hitherto found to have been received by the lungs, in the most powerful inspiration, is nine pints and a half. The quantity received at an easy and natural inspiration, free from any labored effort, is about two pints and a half; but the quantity received at any ordinary inspiration, made without any effort at all, is about one pint.

Walking in the open air, in the garden and the fields, will be productive of but little good to persons thus deprived of the free use of their lungs; a slavery, voluntarily imposed though it be, worse than that lamented by the poet, of those who were deprived of the common air and proper use of their own limbs. But even with all the disadvantages of cramped chest and defective respiration, they who woo the zephyrs in the morning walk will replace the roseate hue on their cheeks for the sickly paleness which had before overspread them. Though short and evanescent the bloom, it gives evidence and promise of what might be obtained and kept, if nature's laws were fully obeyed by the ample inhalation of pure air, by active exercises

of the body—walking varied by occasional running, and both alternating with riding, and these, again, yielding, for a while, to the sports in which the arms are freely used and the chest thereby expanded and strengthened. The spirits of the mountain, the water and the grove, the ministers to Hygiea, should also be the attendants on Beauty, with Flora for her companion. Her attire the while should be borrowed from the Græes, and not forced on her by Fashion.

The active exercises of the lungs are those in which the voice is concerned, as in reading or speaking aloud, declamation and singing. None of these can be used with advantage, unless the chest be freed from all the ligatures and bandages which prevent its full expansion. If this last condition be complied with, they will favor the circulation of the blood in the lungs, and contribute to all the good results which follow, both for health and beauty. I ought to add, that these, like all other exercises, should be commenced with moderation, and adapted to the bodily state of the individual. We are told, that the celebrated naturalist, Cuvier, was thought to have had his life saved and prolonged by his being early called to a professorship, which led him to the regular and moderate exercise of his lungs in teaching. Far different will be the results, if these active exercises be undertaken without preparation and prior training by the weak and

the sickly. A rapid breaking up of the constitution is soon witnessed. Lamentable examples of the infraction of this one of nature's laws are seen, every now and then, in young divines, who, unprepared by previously regulated exercise of the voice, give themselves up to preaching; and this to an excess which the more practised orator could hardly bear. The consequences of this imprudence, well meant though it be, are, naturally, pains in the chest, cough, spitting of blood and other dangerous forms of disease, which often cut short in their career men fitted to give lustre to the pulpit, and, above all, usefulness to their vocation. The sacrifice once made by ignorance to piety draws forth expressions of regret and sincere sympathy from all, and from no quarter more than the congregation, whose intemperate zeal and urgency for his carrying out observances beyond his strength, if not beyond all human strength, may have been among the contributing if not chief disposing causes of the loss of its lamented pastor. Real kindness is best exhibited in acquiring a knowledge of the *causes* of suffering, and in sedulously withholding or removing them. Of little avail, if not for mockery, would be the whining speech of feigned regret and proffer of assistance to a poor wretch, about to die of destitution and hunger, to whom the pharisaical consoler had before refused the pittance which would have procured him bread and raiment.

Who would stand for the principal in this picture? No one—I know of no one—though I can readily believe there are such. And yet, if we were to ask how much of physic is taken up with ineffectual attempts to cure, of law to punish, and of theology to threaten, in place of these professions bringing to bear a more expansive philosophy, in a truly humane study of mankind, towards the prevention of disease, of crime, and of evil passions, we all would shrink, not fearing, but conscious of our inability to sketch the picture; and still more, to exhibit in suitable relief and coloring its various parts. Even were the work done, we would gladly draw a cloud over the figures of deformity, disease, baseness, envy, slander, discord, and cruelty; hoping to see emerge under the hands of the artist, health, peace, and the amenities of life, headed by moral beauty in the personation of the physical.

These last remarks, may be thought to be a long parenthesis, if not a positive deviation from the subject. To this we soon recur, however, by alleging, that although we do not expect to find beauty of person in those who teach us the beauty of holiness, yet ought all our associations with religion to be of a pleasing kind. We can soon forget, it is true, Socratic ugliness, in favor of Socratic wisdom; but we are pained when contemplating the ascetic look, the expression of disease and suffering, in the sallow front, sunken

yet hectic cheek and hollow eye of him, who, whilst inculcating from the pulpit the revealed laws of God, forgets or is ignorant, that he is himself a transgressor of those natural laws of the same beneficent Power, by obstinately inviting and retaining disease, and its formidable drawbacks to equanimity of temper and protracted usefulness.

We are allowed to connect ideas of personal comeliness and youth with piety and devotion, when we remember who was the favored disciple of our Saviour. Would that the neophytes of the present day, who are to exercise the apostolic mission, if they cannot equal the beauty of John, would bear in mind the important truth, that to be fitted for their calling, they should acquire the outward expression, corresponding with the inward grace—those attributes which bespeak health and serenity—a sober earnestness, a collected energy, a joyous content, a consciousness of well being as well as the eager desire of well doing. Preparation is required to fashion and strengthen the body as well as the mind; and he who neglects or has been neglected in the former particular will be deprived of much of his usefulness, if not all his comfort, in the exercise of the latter. Poor is the master of the world whose health is lost.

In dwelling with some emphasis and detail, on the coloring of the skin by pure blood being an

evidence of health and a cause of beauty, it must not be supposed that I undervalue, as I do not mean to overlook, the other qualities of this part. These are its fineness, softness, and freshness, with a moderate degree of turgescence or fulness and plumpness, to which may be added a polish, one of the first conditions, by the way, of mere physical beauty. The brunette may be thus endowed as well as the blonde; but it is in the latter, chiefly, that the charmed eye follows the azure veins seen in relief from and almost blended with the ground of a delicately tinted white skin. Most observers who have had an opportunity of viewing the paintings of Rubens, in which, he represents, as in a gallery, the chief events in the life of Louis XIII., must have gazed with admiring attention on a display of this kind, in the beautiful coloring of Maria de Medicis. She is in a demi-toilet, and yet languid from the sickness which made her a mother.

So closely connected is the healthy condition and of course the beauty of the skin with regularity and vigor of function of other parts of the animal economy, that it furnishes a ready index of which the physician is fully aware, and which cannot escape even the uninitiated. If the digestion be disturbed or bilious disorder of the mildest kind be present, the skin gives notice, and sympathises with the internal suffering organ, by assum-

ing a dingy or a sallow hue, perhaps, at times by its being covered with troublesome eruptions, pimples, blotches, and the like disfigurations.

The means for preserving the beauty of the skin and of restoring it when lost, are the same with those which we should recommend for the promotion and retention of bodily health and vigor. They may be summed up under the heads of cleanliness, a suitable regimen, exercise and cheerfulness.

CLEANLINESS.—Cleanliness, which has been called one of the half virtues, and an auxiliary to those of admitted importance, is recommended to us by Addison, for the three following considerations: first, as a mark of politeness; secondly, as it produces love; and thirdly, as it bears analogy to purity of mind. “In order,” says an English woman of admitted talent, and an ardent stickler for the rights of her sex, (I do not mean any of those who have honored us with a visit, and afterwards given us much good advice,) “In order to preserve health and beauty, I should earnestly recommend frequent ablutions.” To carry out this counsel requires an observance of practices of a much more extended nature than many of either sex, who spend much time at their toilets, are fully aware. A general immersion of the body, at stated but not long intervals, in water of such a temperature as personal experience or good authority may indicate,

is a necessary condition for personal cleanliness, comeliness, and comfort. Where considerations of health or domestic arrangements prevent access to a bath, a ready and convenient substitute presents itself in sponging the entire surface of the body with water of a suitable temperature, tepid or cool, at a fitting hour of the day. As a general rule, the best time is immediately after rising in the morning.

Bathing.—The value attached to bathing, as a supporter of beauty by the Greeks, may be inferred from their mythological account of the origin of Venus, “fresh from ocean born;” and also from the general practice of all those who studied personal appearance. The restorative influence of warm bathing is typified in the story of Mēdēa renewing the freshness of youth to the aged Æson. So, also, we read in Homer, of Andromache preparing warm water for Hector on his return from battle; and of Penelope calling in the aid of baths and inunctions, to mitigate her melancholy for the prolonged absence of her husband. We certainly ought to regard this latter as a much more rational course than that which ladies fair under the influence of grief sometimes follow, of neglecting all the minutiae of the toilet; as if the absent could be consoled by knowing of the personal discomfort which they had caused to their

friends or survivors at home. That the ancients thought warm bathing a wise fashion, is shown in their feigning Minerva to have imparted renewed vigor to the wearied limbs of Hercules, at the warm springs of the afterwards far-famed Thermopylæ; and even limping Vulcan, in place of fine speeches, which he could not make, or of other gifts, offered warm baths to this itinerant redresser of wrongs.

In sacred writ we find evidences of the importance attached to bathing; not only in the Mosaic ceremonials, but also in the miracles performed on Naaman, the leper, who was directed by the prophet Elisha to wash seven times in the Jordan; and still more, on the blind man, who, at the command of our Saviour, washed in the pool of Siloam.

But I need not enter into farther details on this part of my subject, as they will be found in various systematic and popular works.

The Greeks adopted from the inhabitants of Egypt and the East, in bathing, usages congenial with their national love of pleasure and of novelty of sensation. More social than the latter, and more intent on mixing up with the common affairs of life, Epicurean philosophy and patriotic pride, they joined their public baths to the gymnasia; so that athletic sports should be succeeded by bath-

ing, and those again, alternate with conversations on poetry, philosophy, and the arts. One and the chief object of their long and finely sculptured porticoes was to allow the people, on these occasions, as well as in religious ceremonies, to congregate and converse, whilst either slowly walking or, what was less frequent, when seated.

Sea bathing must have been in high repute amongst the Athenians, if we may judge from a scene in Aristophanes, in which Plutus is led to the temple of Esculapius, in order to cure him of blindness. That application which should open the visual orbs of avarice to a sight of others' wants and sufferings, and the hand in unison to offer relief, would, indeed, be the grand medicament, equal in the magnitude of its effects to what was presumed of the philosopher's stone.

The Romans, imitators in so many respects, of the Greeks, were too apt to measure grandeur by size, in their buildings. In the baths of Caracalla, three thousand persons could be accommodated at once. Bathing was practised in every variety of cold, warm, hot, and vapor.

It is among the nations of the great Scythian or Tartar family, that the vapor bath is in most general use. Of these the Russians and Finlanders, Turks and Persians, are conspicuous, by their fondness for a practice, the origin and continuance

of which can hardly be referred to climate, when we find it prevailing under latitudes so remote from each other as the North Cape and the Gulf of Persia; nor to religion, since it is participated in by the immense population of the Greek church, as well as by the hordes professing the Mahometan faith. There is this difference, however, that the people of the north are most partial to the moist; those of the south to the dry vapor bath.

All travellers in Turkey and the East join in praises of the deterging effects on the skin, and of the pleasurable sensations diffused through the whole frame, after the use of the vapor bath. A person who had recourse to it for the first time, would experience some feeling of surprise, if not alarm, at the quantity of the outer or scarf-skin, and of the matters that had been dried on it, which is separated. More especially is this good effect obtained by the subsequent rubbing and strigilation, accessories to the bath, which, with us are too much overlooked, as well as the kneading or massage of the muscles, and stretching and cracking all the joints of the body. By these processes the skin acquires a purity, a softness, and a polish which would excite the despair of a very Don Quixote amongst the venders of lotions and oils of Macassar. The warm or vapor bath is more efficient than the cold one, to produce a requisite purification, by the removal of an oleaginous matter

which is secreted from the skin in addition to the fluid and gases already mentioned.

To the women of the East, a visit to the bath is a source of the greatest enjoyment. It is at once their coffee house, exchange, and tea party, which they visit in full costume; and where they give and receive all the news and details of their respective harems, talk of fashions, and perhaps, if ladies ever do such matters, settle the character of the absent, by discussing their peccadilloes. It is said, indeed, that there is nothing in our meetings like the conversational riot that is witnessed on those occasions.

The Turkish baths and their female visitors have been described by two lady travellers within rather more than a century of each other; the first is Lady Mary Wortley Montagu, a woman of wit, wanting in delicacy, dirty, and a dowdy; the second is Miss Pardoe, in her late and last work, the "City of the Sultan." If Lady Mary had introduced into England, in addition to the practice of inoculating, the Turkish baths, and set an example by using them herself; her countrywomen, and doubtless our own might have gained an admirable addition to the appliances of health and beauty. But, on the other hand, we should have lost that characteristic reply of hers to a French lady, who was expressing surprise at her hands being apparently so unwashed. *Ah Madame! si vous voyiez mes pieds.*

It has been already stated, that friction of the skin is an excellent adjunct to the bath, and be it added, one of the best substitutes for exercise.

REGIMEN.—The second means indicated for preserving the beauty of the skin, is a suitable regimen. By this I mean food in such quantity, of such a quality, and at such intervals as shall, whilst it please, not flatter nor tickle, the palate; but give nourishment without any feeling of oppression or discomfort during the entire period of digestion. This may be considered one of those oracular announcements, which the members of the medical profession have the privilege of making, and which leave the wondering inquirer about as well informed as before. In justification, however, I must be allowed to say, that at present I am necessarily restricted to a general consideration of principles, the details of which, can be hereafter carried out at leisure.

The skin has been already declared to be an index to the state of the internal organs of the body. It should be added, that it is a complete reflector, one might say tell-tale of the health or disease of the stomach. There are some cases in which this fact is more remarkably illustrated; as where an eruption of the skin follows almost immediately the eating of particular kinds of fish, especially of shell fish; pimples and the like from the use of

butter; flushed cheeks after a draught of stimulating liquor, &c. Among the articles of food in common use, most prejudicial to the health and beauty of the skin, are hot bread, or hot toast and butter, chocolate, strong coffee, pastries, pickles, much salad, smoked meats, and fish. Of the practices at the table, in regard to eating most to be deprecated, is the partaking, at the same meal, of a number of different articles of food; highly seasoned soups, fish, patés, roast and boiled meats, game, tarts, ices, fruits, &c. We are told that women, regardful of beauty, do not use either fermented or spirituous liquors. Wines are especially inimical to the skin. They may do for the worship of Bacchus; but they are most unfit offerings at the shrine of Venus. The fountain of the Muses, the waters of the famed Helicon and Parnassus, are those from which the Graces would be supposed to draw for the use of the servitors in her temple.

But without the third requisite be fulfilled, the other two will fail to produce the desired effect. It is exercise which contributes, and is indeed necessary to good digestion, to the conversion of the food into blood, to the complete circulation of this fluid through the skin and to its purification in the lungs by respiration, in the manner already mentioned. Hints might be advantageously taken on this point, from the course of training of that noble

quadruped, the horse, for the race and the hunt, and of the ignoble biped, the professed pugilist, for the contests in the ring. Both these *animals*, by their being subjected to methodical diet and full exercise of the body and limbs, and frictions of the skin, acquire not only a strength and an activity which almost stagger belief, but, also, a smoothness and glossiness of external surface, which is in itself a variety of beauty. Exercise—and that should be brisk exercise, which constitutes so essential a part of beauty-training, acts like a charm upon the most harsh, rigid, and obstructed skin, and makes it soft and supple; while the subsequent bathing, or sponging, and friction clear away all external impurities.

Apollo, the poetical representative, and by the skill of the sculptor the impersonation, of manly beauty, was swift of foot, and a hunter of unerring bow on earth; and when in the heavens drove from morn to night the chariot of the sun. In this fiction, we have pictured out to us some of the chief conditions for the preservation and, if begun early, the acquirement of manly beauty, with added ease and grace. These cannot be entirely overlooked, even by the hero of a drawing room; if he would win regard for other attributes than the studied postures and movements of his dancing master.

The last condition for a pure and healthy skin,

is a cheerful frame of mind; which, also, gives harmony of expression to the features, as well as those easy movements of the body that almost border on grace. One may not go quite so far as an ancient philosopher, in saying, that all the diseases of the body depend upon perturbations of the mind; but this much we ought to know, that strong and contending passions will disfigure the face more than the ravages of small pox itself. To the latter as to a defaced building we become accustomed. The other, like the raging of the storm, causing present destruction and threatening still more, awakens our fears, and alarms as much by the mistrust in our present safety as by the actual ills which it brings in its train. Continued fidgetiness, impatience, hopes wrong directed, a mind without meaning, and definite object or regular employment, will keep the nervous system disordered, and through it cause disturbed circulation of the blood, imperfect digestion, with their consequences in a bilious hue of the skin and discomposure of the features.

OF THE HAIR AND NAILS.

Connected with the skin, resembling it, especially the outer or scarf, in many respects, and dependent in a great degree on its healthy condition for their growth and beauty, are the hair and nails. A

languid circulation of the blood and inertness of the skin, manifested by its paleness, dryness, and roughness, are accompanied by a thin growth of hair, which is moreover long and lank; and the nails are at the same time brittle, and wanting in their graceful curvature and roseate hue. This hue proceeds entirely from the bloodvessels beneath the nail, which is sufficiently transparent to allow of the blood being seen through it. Impeded circulation and an accumulation of blood in the small veins of the skin, are manifested by a blueness of the nails and also of the lips, as in the chill of intermittent fever, attacks of asthma, &c. In these cases the breathing is, also, laborious, and the blood is not changed as it ought to be in the lungs.

THE HAIR.—The hair, in addition to its uses in the animal economy, has been ever most appropriately regarded as one of the greatest ornaments of the human head. As a mere mass crowning the body, it serves the purpose of a frame or setting and groundwork, from which the face shines out with animation and grace. But when divided into tresses, curved into curls and exhibiting numerous serpentine and waving lines, it is itself a source of beauty which has been described and praised in all ages. Soft curls agitated by the wind have been the theme of every poet. When the hair divides in a line extending from the crown to the

forehead and is closely combed so as to allow of the arched form of the head being exhibited it adds a certain degree of dignity to the expression of the face. But when it falls over the temples and takes the form of finely turned ringlets and discloses the forehead, the dividing line of the hair above uniting with the median line of the face in general, and that of the nose in particular, the whole features acquire a peculiar symmetry and beauty. This symmetrical arrangement of the hair bestows an intellectual air; and is especially evident where there is a natural parting and readiness of the hair to fall on each side from the top of the head, owing to the elevation of the forehead, itself an index of mind, and, according to some, characteristic of beauty in woman.

That this was thought to be a physiognomical trait evincing sweetness of disposition united to firmness and possession of the higher observing faculties we have abundant proof, in the representations of the more elevated personages by the ancient sculptors, and in the heads of Guido and Rafael. What spectacle, it is asked, can be more seducing than that of jet black hair falling in undulating ringlets upon the shoulders and bosom of a youthful beauty? The distinctive epithets by which Homer designates Helen, that fair but false one, who set all Greece and Asia in arms, was the beautiful-haired.

The quantity and color of the hair are always in relation with the constitution of the individual to which it belongs and are one of the characteristic signs of temperament. In northern latitudes it is smooth and fine, and of a fair or light color. In southern climates it is dark or black, stronger and coarser; and more readily and naturally grows in curls.

The hair, which, if not most generally admired, is that which certainly has been most celebrated in poetry and song, and has served as the favorite model of the painter, is light colored, fine and flexible. Fair golden hair was, of all tints, that which the ancient artists preferred. It was assigned by them to the most beautiful, not only amongst the Gods, as Apollo (the golden haired Apollo) and Bacchus, but also amongst the heroes: Alexander the Great had flaxen hair. *Il biondo Dio* is the title by which the modern Italians designate Cupid.

We might adduce, as additional proof of the deep rooted belief of the great beauty of light colored hair, the fact, that from the earliest pictorial representations of our Saviour down to those of the present day, he is always depicted with this kind of hair or approaching to the golden hue; although, as every reader knows, the national Jewish color was dark brown or black.

The different styles of wearing the hair will not detain me. It is sufficient for us to be aware of some general principles in this respect. In infancy,

the hair should be allowed to grow in short curls; but if these do not come naturally, it would be the height of absurdity to procure them by art. In adolescence, especially of the other sex, the hair may be allowed to flow in longer curls or ringlets and tresses. Womanhood reached, it should be arranged in a symmetrical fashion, regularly parted at the median line, as already described, carefully combed and lying smoothly on the upper and arched part of the head; and either carried back from the forehead above the ears perfectly smooth, or in part falling somewhat over the temples in short and graceful curls, like the tendrils of the vine.

If it be desired to give the greatest degree of simplicity and ingenuousness of appearance, and especially if the features are very symmetrical and mild in their expression, the effect will be increased by the hair being parted at the forehead and brought round, in a semi-arched form and plain, over the temples and above the ears.

Occasionally, for dramatic effect, a profusion of curls, some of them falling over the forehead and eyes, may please; but the expression is seldom pleasant to the observer, or advantageous to the wearer. The sparkle of the eye through these curls dazzles it is true, and produces a powerful sensation; but it is in part one of a dread of sinister results, and gives rise to unpleasant associations.

Passing from the question of taste to that of health, it will be easy to show the dependence of the vigorous growth, fineness and glossiness of the hair on the healthy state of the body in general, and of that of the skin in particular. After an attack of fever or of any violent disease, the hair falls off in great quantity, and is sometimes long in being reproduced in its pristine abundance. In languid states of the system of long duration, caused or kept up by weak digestion and associated with cold extremities and a dry rough skin, the hair is of feeble growth, and comes away readily with the customary combing and brushing. Whatever causes diminish the activity of the powers of life, whether physical or moral; excesses of any kind, late hours, privation of sleep, anxiety and grief, will all have a prejudicial effect on the hair. Sometimes, under the operation of one or other of these agents it becomes prematurely gray, as happened in the course of a single night to the unfortunate Marie Antoinette, queen of France. More commonly it is thinned and lank.

It may happen that the cause which impedes the healthy and abundant growth of the hair is local and confined to the scalp alone. A neglect of cleanliness, by not removing the accumulation of perspired matter which after a time forms crusts or a coating, occasionally gives rise to inflammation and sores of this part. The hair becomes

tangled and matted, and readily falls off. Relief in this case is obtained by having the hair cut at short intervals, and the head washed daily, with a sponge, in tepid water and Castile soap; and afterwards rubbed with a coarse towel, and well but not very roughly brushed for some time, until the hair is dry.

A preventive to any unpleasant thing of the kind just mentioned will consist in the regular daily use of a comb sufficiently fine to cleanse the hair of matter adherent to it, and of a brush twice or more daily, so that the surface of the scalp, from which the hair grows, shall be reached and not only cleared of dandruff and the like dried perspirable matter and dust; but, also, be subjected to a moderate friction. At stated intervals; daily, or on alternate days, the whole head should be sponged in the manner above mentioned, prior to the use of the comb and brush.

There are two opposite conditions of the hair: 1. Of extreme dryness and wiriness; 2. Of oiliness and undue softness, which urge those who suffer from them to have recourse to various washes or oils, according to the inconvenience complained of. Nearly all applications of this nature are useless; some of them mischievous. The defects in the state of the hair arise from an unhealthy or disordered state of the scalp, the soil as it were from which the hair grows. Where dryness and

stiffness of the hair are the fault, relief will be obtained by procuring a restoration of the natural secretion or discharge from the surface of the scalp, which acts as an unguent to the hair above. With this view regular exercise should be had recourse to; since whatever induces perspiration of the skin generally will have the same effect on that portion of it covering the head. A person, who has taken a long walk and perspires freely in consequence, is, sensible, on applying the hand to the hair, of its greater smoothness than when leaving home. Often the hair falls out of curl under these circumstances, owing to the abundant supply of this natural unguent and perspirable matter which are conducted along each hair, and which had been previously exuded from the scalp. Ladies not uncommonly lay the blame of this derangement of the labor of their toilet on the humidity of the air. The true cause is that just stated.

The opposite state of the hair to that now described, is its being constantly and in excess softened and oiled, as it were, with the too abundant discharge from the surface of the scalp. Various washes, some of a spirituous kind, the chief of which is cologne water, and others astringent, and sometimes even powders, in which poisonous ingredients are introduced, have been employed, with a view of somewhat drying the hair, but really with the antecedent effect of checking the discharge of per-

spirable and oleaginous matters from the scalp or skin of the head. Against recourse to such practices, as fraught with danger I would caution all persons of both sexes. It is at all times hazardous to check, by this means, perspiration from any region of the body; but more especially is there room to fear the worst consequences, in the form of violent head-aches, convulsions, alarming diseases of the brain and of other important organs, from suppressed perspiration of the hairy scalp.

The diminution, for we ought not to wish the entire removal, of the natural discharge from the field of the hair, or surface of the scalp is obtained by regular ablution of the part with soap and water; or with water in which a small portion of common salt has been dissolved. Frequent dry friction with a coarse towel or a brush which is not too hard, is also serviceable. In those cases in which the skin of the head is so easily excited as to be thrown into a sweat with the least exercise; and in which it becomes enfeebled and the hair thin and falls off, I have seen a restoration of this ornamental growth by the measures detailed. Salt and water is perhaps one of the best restoratives of the hair, by restoring the tone of the skin from which it grows.

The growth of the hair is often impeded and its glossiness impaired by various manipulations to to which it is subjected, under the hands of the

coiffeur or tire woman; or, in the absence of these important personages, by the lady herself. By being much stretched and twisted, and curled, as was once so common, with hot irons, the hair, if not loosened at its roots, is so strained at its points of connection with the skin as to readily come away; nor is its place supplied with any readiness by a fresh growth.

THE NAILS.—The nails may be considered as appendages to, and in a measure prolongations of, the skin. Their beauty is displayed in their figure, their surface and their color. They ought to be smooth, polished, somewhat transparent and rose colored.

As their use consists in the protection which they afford, on their inner side, to the ends of the fingers and toes, and, on the other, in suitable support, by resistance to the pressure of bodies to be grasped by the fingers or examined by the sense of touch, they should extend a little beyond the flesh which terminates these organs. The form of the nails depends much on the care employed in cutting them during early life, and still more on the mode of employing the hand.

The most effectual method for injuring and disfiguring the nails, and interfering with the sense of touch and the delicate processes in which the fingers are so frequently required, is by biting

and gnawing them, so as to keep them excessively short and close to the quick. There is not only a loss of ornamental termination of the hand but a positive and serious diminution of its usefulness by this bad habit; an indulgence, besides, which throws the person, for the time being, into a most ungraceful posture, not very unlike that of a monkey cracking nuts.

CHAPTER II.

OF THE ROUNDED OUTLINE AND DISTINCT CONTOUR OF
THE TRUNK AND LIMBS OF THE HUMAN BODY.

THE elements of beauty, both in inanimate and animate beings, are entireness without abrupt breaks, as in rounded forms; delicacy, smoothness, variety in curved lines and figures, contrast in the several parts. Sharp points and angles and straight lines offend the sight, which in this instance is an exponent of the impressions that would be produced by these things on the sense of touch. Cylindrical or spherical bodies, at first pleasing, would after a while weary by their sameness. Roundness, gradual transition in undulating and serpentine lines, progressively diminishing circles in the limbs, exist more at the surface of the human body than at that of any other animal or object in nature.

The muscles, those red fleshy bodies which surround the bones, and pass from one bone to another and which, when they contract and tend thereby to approximate their two ends, are also the organs of motion, exhibit a gradual swell in their middles, and come under the head of rounded and gradually

diminishing forms. The diminution is usually at their extremities where they end in firm elastic cords or tendons, the insertion of which latter into the bones prevents the inconvenience and unseemly appearance of projecting flesh at the joints.

Familiar examples of this arrangement are seen in the hands and feet, the joints of which and especially of the fingers and toes, are pulled in different directions, either for flexion or extension, by these tendons, themselves obeying the motion communicated to them by the contraction and approximation of the fleshy bodies or the muscles proper with which they are in a direct continuous line. Contrast and variety in the swell of the arm and leg, alternating with the thinness of the wrist and lower limbs just above the ankle and the enlargement of parts again on the hand and foot, are obtained by this means. But these numerous tendons, like so many ropes, would jut out abruptly in straight lines during the contraction of the muscles and the movements of the limbs, were there not some additional provision by strong cross bands, as at the wrist and at intervals along the fingers, and by firm parchment like membranes in other parts. "Wherever," as Hogarth well observes, "for the sake of the necessary motion of the parts, with proper strength and agility, the insertions of the muscles are too hard and sudden, their swellings too bold or the hollows between

them too deep, for their outlines to be beautiful; nature softens these hardnesses, and plumps up these vacancies with a proper supply of fat, and covers the whole with the soft, smooth, springy, and, in delicate life, almost transparent skin, which conforming itself to the external shape of all the parts beneath, expresses to the eye the idea of its contents with the utmost delicacy of beauty and grace.”

It is principally in the features of the face, as has been often observed, and on the surface of the trunk and limbs of a beautiful woman, that these delicate, bending, varied and contrasted lines are multiplied; by their union they mark the outlines of different parts, as in the region of the neck, of the bosom, at the shoulders, on the surface of the abdomen, on the sides, and principally in the gradual transition from the head to the neck, and from the loins to the inferior extremities.*

These lines vary under different circumstances; much embonpoint, or fulness of flesh, producing round lines, and leanness or old age producing straight ones.

There is an excellent lesson contained in the following remarks of Burke, which we would impress on the attention of those of our fair readers who persist in reducing their bodies to the figure of

* WALKER'S *Analysis of Beauty*.

a mere cylinder, and destroy all the easy and almost insensible swell and undulation from part to part, so indicative of, and essential to true beauty. "Observe that part of a beautiful woman where she is perhaps the most beautiful, about the neck and breasts; the smoothness, the softness, the easy and insensible swell, the variety of the surface, which is never for the smallest space the same, the deceitful maze, through which the unsteady eye glides giddily, without knowing where to fix or whither it is carried. Is not this a demonstration of that change of surface, continual, and yet hardly perceptible at any point, which forms one of the great constituents of beauty?"

The hair affords an excellent instance of this agreeable complication, in its soft curls and flowing tresses agitated by the wind. "And yet," says Hogarth, "to show how excess ought to be avoided in intricacy as well as in every other principle, the very same head of hair wisped and matted together, would make the most disagreeable figure; because the eye would be perplexed and at a fault, and unable to trace such a confused number of uncomposed and entangled lines."

A primary condition for the display of the rounded and undulating lines, so much admired in woman and so essential to beauty, is a certain degree of fulness, bordering on plumpness of the body and of its several parts. And for this state of things

to exist there must be health, manifested by good digestion and activity of the nutritive functions. Woman has the same number and arrangement of bones and of their fleshy envelopes, the muscles, as man. But in her there is a greater abundance of fat and of an analogous tissue, called cellular or reticulated, both of which in woman fill up the interstices between the muscles, are spread over the joints and tendons, and constitute a layer under the skin. The tendons of the feet and hands and at the wrists of man, which are so commonly seen clearly defined, especially in active exercise of the limbs, are, in the other sex, covered with a cushion of fat and reticulated tissue, which give that pleasing and arched outline as well as softness to both the hands and feet. In like manner are filled up the spaces between and around the muscles of the face which are not so well defined in woman, and the contractions of which without being visible are just sufficient to move the eyelids, mouth, and nostrils, for the purposes of expression. It is owing to the profusion of this same tissue under the skin and over the muscles that the limbs acquire a greater fulness and roundness, and that the shoulders above and haunches below are lost imperceptibly in the limbs with which they are connected.

This fulness of the parts and swelling and undulating outline are pleasing to the eye, because they give proofs of fitness and of health, necessary con-

ditions for beauty. A reverse state, in the folds of the skin or wrinkles, and projection of the muscles and unclotted tendons, is displeasing, not only because they show deficiency in the harmonies of form and proportion, but because they are indications of sickness, old age, or the shock of strong and contending passions.

Although there is a contrast between the contour of the individuals of the two sexes; that of woman being, as already shown, more full and less marked by straight lines and angles; yet in the finest exhibitions of manly beauty, there is also a certain softness and delicacy in the external configuration. The course of the muscles and their tendinous terminations without being entirely concealed are measurably covered, and all asperities of lines and abrupt breaks removed, by the cellular and fatty tissues surrounding those parts and distributed under the skin. The face, also, has an expression of calmness from the same arrangement of its soft parts. Examples of this style of manly beauty are seen in the Apollo Belvidere, and the Perseus of Canova. A nearer approach again to the female and its characteristic fulness and roundness of forms are met with in the Antinous and the Fauns. Very different from these and in contrast with the female figure is that of the Farnese Hercules, whose massive muscles are so clearly defined and convey inevitably the idea of brute but passive

strength, whilst Appollo suggests agility and swift-ness.

The greater abundance of loose texture in the body of woman and interposed between her different organs gives to all of them a suppleness that renders her capable of easily yielding to the great revolutions which affect her organisation, in regard to reproduction, as well as mark the different periods of her life. It is principally this excess of the cellular and fatty tissues which gives to the members of woman those round and beautiful outlines, that soft and polished surface which the body of man does not possess.

It appears, also, that the true skin is much thinner and more delicate in woman than in man, and that it derives more or less of its clear whiteness from the quantity of fat which is below it; for leanness always tarnishes and soils it. Hence, to possess a fine, soft, white and fresh skin, it is also indispensable to possess plumpness.

While the skin is thus more white in woman it is also more transparent. The tissue between the true skin and the outer or scarf-skin appears to have more clearness and turgescence, especially in the face, where, under the influence of various emotions, it easily permits a passage to the blood, as we see in blushing. It is in youth that this turgescence and clearness are most evident.

Hence the skin in woman less conceals the veins,

of which the color, only enfeebled or modified by the skin, "gives all those shades of azure, which the charmed eye follows with so much pleasure on the surface of the bosom and of all the parts where the skin has least thickness."

All this constitutes freshness, or animation, which is nearly synonymous with health, and without which there is no beauty.

It has been already intimated that the fulness and plumpness of the external parts and the consequent rounded outline of the forms, presuppose good digestion and active and regular nutrition. The strongest and at the same time most familiar proof of this connection and order of vital phenomena is met with in infancy and early life. At this period the calls for food are frequent and strong, the disposal of it by digestion prompt and the abundant deposal of organised matter in and around all the organs correspondingly full. The cellular and fatty tissues under the skin are particularly abundant, and impart to the face and members of infants and those individuals in the first septennial of their existence an expression of mildness, ingenuousness and innocence, associated with and in a measure dependent on full health.

The present is an appropriate occasion to make a few remarks on digestion, since the object and end of this function are the growth of the body and of its several parts, and the reparation of waste matter

carried away by the other functions, such as perspiration, &c.

DIGESTION.—It may happen that some of those persons who shall peruse these pages are in that happy state of ignorance as not to know where their stomach lies; although they may have heard something vaguely about its being the organ by and in which their food is digested. I should be sorry to disturb by unseasonable knowledge this ignorance, and therefore shall not detail, as it has been my duty to do so often elsewhere, the figure, structure, 'situation and connection' of this important organ; the measure although it be, if not the seat, of some men's sensibilities and conscience. When pointing out, however, the needless cruelty with which the stomach is treated by external pressure, and the curtailment of the range of movement to which it is legally, that is physiologically, entitled, I must mention where it is and something about its neighbors, which are hurt by the same practices that injure it.

In order that the stomach should perform its duties with regularity and efficiency, the food introduced in it must not be too heterogeneous; nor taken at irregular intervals. No matter how keen the appetite or vigorous the digestion, the stomach will assuredly suffer ere long by a great variety of articles of food being introduced into it at one

repast; and especially if this latter be taken at an unaccustomed hour. It sometimes happens, that robust persons will continue a course of excessive and irregular repletion for a length of time, without acknowledging any disturbance of the animal economy in consequence. They will be the less inclined to admit that they suffer from this cause, if they make no complaint of nor feel any uneasiness or pain in the region of the stomach, nor are troubled with heartburn or nausea. But even these persons, who think themselves, and are sometimes cited by others, to be exempt from hygienic laws and privileged to laugh at the doctor, pay penalties for disobedience in unexpected and inconvenient forms. Their digestion, they will tell us, is good, but yet, they admit that their sleep is not as tranquil and refreshing as it used to be. They awake in the morning unrefreshed, hot and thirsty, and with a disagreeable if not bitter taste and a loaded or foul tongue. They insist upon having good digestion, although the clearness of their complexion has yielded to a tinge of sallowness, or a slight addition of yellow to its red and white; an appearance by the way most evident and of earliest occurrence in the white of the eye, as it is commonly called.

I may state here, that every person, male or female, whilst at the toilet, can tell immediately, without any of the learning or knowledge of the

technicalities of the schools, whether the circulation of their blood, their respiration, and their digestion are regularly performed. The color of their lips and nails will be a suitable evidence of the two first, and the color of the white of the eye of the last, of these important functions. Pale lips and nails betoken a languid circulation, if not poverty of the blood; whilst their blueness or lividness show both obstructed circulation and respiration, and that the blood is not sufficiently exposed to the air in the lungs, nor undergoes the requisite changes, by the escape of its carbon and the acquisition of oxygen, to enable it to acquire its color, nor the other properties fitting it to give nourishment to all the organs of the body. Whilst a red tint is that of full health, a very bright scarlet hue of the lips, on the other hand, is a symptom of a too active circulation and a morbid state of the respiration, as in some cases of pulmonary consumption.

A loss of the usual clearness of the white of the eye, and in its place a turbidness and a slight yellowish discoloration are among the earliest and surest symptoms of indigestion and bilious disorder.

As regards the proportions of animal and vegetable aliment most favorable to digestion, it is not easy to lay down a rule susceptible of any thing like positive application. Young persons, whose stomach, for the most part, performs its functions

with despatch and completeness, and in whom blood is readily and largely formed from the elaborated fluid of digestion, or the chyle, should use, relatively, larger quantities of vegetable food; bread of various kinds, potatoes, rice, spinach, carrots, turnips, &c., and ripe and preserved fruits. Milk or milk and water is a preferable beverage to tea and coffee, mornings and evenings.

Where the habit of body is naturally gross and the temperament sanguine, there is a tendency to accumulation of blood in the head, with flushed cheeks or fulness and heat in other organs, the regimen should be almost exclusively vegetable. Not only will many serious and alarming diseases be warded off by this means, but personal appearance will be greatly improved; the skin made smoother and softer, and the complexion clearer and exhibiting the blended hues of the lily and the rose. Nutrition will go on more equably, and be manifested by a more harmonious outline of feature and limbs under this simple regimen than where more stimulating aliment, drawn from the animal kingdom and seasoned with various condiments has been used. Some of the most agreeable examples of infantile health and joyousness of spirits, and of maidenly beauty and loveliness are of persons whose food is habitually simple, and mainly, if not exclusively, vegetable, including the ripe fruits of the season.

But whilst thus recommending to young persons,

and to those in the prime and vigor of life, to use vegetable food in large proportion, I must be understood to refer to that which has undergone appropriate culinary changes. Bread and pastry are both of them made chiefly from flour; but they are vastly different in the readiness with which they are digested and the amount furnished towards the nutrition of the body. The first is nutritive and salutary; the second too often oppressive to the stomach, interfering with digestion and consequently nutrition. In bread itself, the difference is great and important, between that which is well baked and raised, and has been kept a day after being out of the oven, and that which is imperfectly baked and raised, and is eaten either warm or while yet fresh. The former is one of the most nutritious and strengthening articles of food; the other nearly the reverse. Potatoes badly prepared and sodden will irritate a weak stomach, and bring on an attack of dyspepsia. Well boiled and mealy, or roasted, they may often be eaten with impunity by the invalid, and will give to a person in health an abundant nutriment.

Milk with good bread and such vegetables as the potatoe and rice, or rye and Indian meal in the form of mush, constitute food admirably adapted to the young, and to those, who for want of suitable out door exercise would suffer from the regular use of animal substances. Sometimes, milk disagrees on account of its coldness, which may be obviated,

and its oppressiveness to certain stomachs prevented, by the addition of a portion, from a third to a half, of hot water. In other cases, a compromise of interests between taste and salubrity, may be effected, by the addition to tea or coffee of an equal quantity of milk or cream. It has been found that this latter will agree with some weak and disordered stomachs, to which milk is rather inimical.

Of a milder nature than common animal substances is the egg, which, if soft boiled, will generally be found easy of digestion. Whereas, few articles task so severely the powers of the stomach as a hard boiled egg, and particularly the white of it.

Under a regimen of the kind just described, not only will the fulness of figure and the glow of health be preserved; but the wan and the feeble will regain strength and animation. Occasionally, however, we meet with persons of both sexes, and particularly females, whose skin is pale and cold, circulation languid and digestion either torpid or very irregular. The tongue, for the most part, is whitish and slightly coated; and there is an absence of even the customary thirst. In such cases, recourse will be had, advantageously, to the daily use of animal food; with the understanding, that regular exercise in the open air be, also, taken. Without this condition, there will be danger of the person, whilst yielding to the calls of appetite and

indulging in the use of this nutritious and stimulating aliment, being a sufferer from undue determinations of blood to a particular organ, the head, lungs, &c., and even of inflammation supervening.

Any attempt at sudden invigoration of persons, thus habitually weak and wanting in activity of nutrition, will fail, and leave them worse than before; as where strong tea, coffee, that greasy mixture, common chocolate, stimulating condiments and cordials, wine, and malt liquors, rich soups and gravies, are taken in alternation or succession. I do not speak, now, in opposition to, or disparagement of, the recommendation of a physician, in any case directly under his guidance, and in which his opinion is asked professionally. My remark applies to the rules of hygiene for the government of those who are in quest of health and strength and good looks; and who hope to retain these, when procured, by aids not medicinal, but which must be of daily and prolonged use. To attain this end, no bitter, nor tonic, nor cordial, derived from the shops, no fermented and, still less, distilled alcoholic liquor, can be regularly taken. On the contrary, a long perseverance in their use will be found eminently detrimental both to health and beauty. The only means of permanent restoration of the exhausted economy and feeble frame and deficiency of contour are plain nourishing food, free exercise in the open

air, regular occupations, tranquillity of mind and a proper allotment of time for sleep.

Not less marked are the modifications produced by culinary processes on animal food than are those on vegetable to which I have just adverted. The chief end to be attained by the art of cookery is a softening of the fibres of the meat and, at the same time, a retention of its juices. Much of the latter are dissipated by boiling, after the common method. That which ought to be preferred is the subjection of the meat to a regular and protracted heat, in a small quantity of water, as in stewing. By roasting, the juices are in greater proportion retained than by boiling, and the fibre is tolerably well softened, except that of the outer portion, which is crisped and condensed.

Fried meats of any description are unwholesome. By tasking the stomach unduly, they cause indigestion and not unfrequently eruptions and discolorations of the skin. More especially does this remark apply where butter is used in the process, and fish is the article fried.

Dried, and salted and smoked meats do not furnish that nutriment which is necessary to give the requisite proportion of blood and other fluids and of fatty deposit, in order to constitute the desired fullness of outline so essential to abiding beauty.

Pastry, and especially such a leaden substance as

is commonly inflicted on us under this name, gives no adequate return for the discomfort which it is so apt to cause to the stomach. Alone, it does not constitute a meal fit for civilised or savage man, or woman either. Added to or coming in after other kinds of food, whether animal or vegetable, it is bad company, and interferes with the due digestion of these substances.

With equal force do these remarks apply to various kinds of cakes and confectionary, which together with pastry, are given to children, as a lure to good behavior, and a bribe against misconduct. The mind is thus appealed to through the stomach; and such an appeal! Disturbances and riots in the poor stomach first take place; and then the disposition becomes savage; and the little beings indulge in all kinds of vagaries and passionate outbreaks, which the kind mammas or sage nurses think they shall appease by appeals similar to those made at first. More cakes or pies or sugar plums, and perhaps all three in quick succession, are given to the poor little dears, either because they cry, or to prevent them from crying. The tumult increases, and at length an attempt is made to quell it, similar to the reading of the riot act to a mob, which, for the nonce, considers itself legislature and jury, and proceeds forthwith to hang people on suspicion and to burn their houses, to show its sense of justice. The book of "Domestic Medicine" is read, and a

dose such as it directs is administered to the poor little sufferer. This, like the sheriff's reading to the mob, proving ineffectual, the physician is called in by the alarmed mother, as the military are by the officer of law; and in both instances with a similar result, viz: the shedding of blood; and, to carry out still farther the parallel, in both with a cooling effect.

But short of this extreme termination of the cruelty of educating children to habits of gluttony, and associating these in their minds with ideas of reward and distinction, are many inconveniences and discomforts, both on the score of health and of good looks. The digestion is habitually deranged; the child is said to have worms, and on this account is sorely vexed with a variety of anthelmintics, the last one advertised being always preferred. The teeth decay, the breath is offensive, the natural beauty of the skin, which in children ought to exhibit freshness and fairness, with a slight roscate color, is replaced by a sallow or dingy hue. The full development of all the parts, the trunk and limbs and face, disappears. The features no longer wear the aspect of cheerfulness, but show care and suffering; the limbs have lost their roundness and the whole body those springy and joyous movements, to which it is prone under the happy instinct of animal life in healthy children.

If the subject of this poisonous course of feeding,

by the frequent administration of the irritating and indigestible articles now under view, be a boy, a remedy is offered in the counteracting influences of various sports in the open air, and, a little later, his transfer to a school, on which, whatever may be its faults, that of high and luxurious living can seldom be charged.

But, if the little being belong to the other sex, additional agencies are brought to bear, to her still farther detriment. She is already delicate and languid, and disinclined to motion, by the indulgence in a depraved appetite for "good things," as the abominations above mentioned are called; and she is now kept in the house and perhaps in a close and badly ventilated room; and, as if for fear she might yield to the instinct of her age, by engaging in some gambols, she is dressed in clothes so tightly put on as to prevent the full movements of her body, in its various inflections, and the free exercise of the limbs, in running and jumping, clapping her hands, &c. She is told to behave like a little lady, that is, to sit still or to move with head erect in short and measured steps, and not to rumple or soil her dress.

Under this discipline, the joints and bony prominences lose their appropriate fleshy investments; the figure is scraggy, and often remains so during adolescence and into ripening womanhood. Then the climate is abused, and sundry causes for the want

of the full development of the forms and of the contour so essential for beauty are assigned; but, generally, with a careful omission of the true ones. If these be suggested by some well meaning person, who is simple enough to believe, that experience and rectitude of intention will make him be listened to, he is silenced as a croaker, or a visionary cynic; one who wishes to curtail the pleasures of childhood and to check the affectionate outbreaks of parental love. It will be in vain for him to allege that he speaks in reference to the means of enjoyment by the young and to its being prolonged into after life; and that it is from his regard for both children and parents that he is anxious for a reform of practices, which he knows to be so prejudicial to the happiness of both.

OBEITY.—It must seem strange, that, although all our ideas of beauty of the human form are associated with those of a full and rounded outline of its several parts, the fear of excessive fulness or of fatness greatly predominates over that of leanness or even of meagreness. This is an evidence of the power of adventitious taste and of fashion over nature and those models in nature which are representatives of health and beauty. Were the human body, itself, made the subject of study, and the proportions and outlines of its several parts, especially of those concerned in locomotion, understood, in connection

with their uses, we should find but little difference of sentiment on the essentials of beauty, whatsoever we might think of the lines and angles and abrupt swells of a figure made by dress. Feebleness of movement would no longer be considered graceful, nor paleness of complexion and general meagreness of frame be regarded among the attributes of beauty.

The first evidences of an approach to fleshiness or a deposit of cellular and fatty matter under the skin, so as to constitute a notable fulness of feature and of limb, are often seen by their possessor with alarm; and measures, generally prejudicial to health, are at once had recourse to for their removal. The calls of appetite are disregarded, or appeased by articles which weaken and disorder the digestion, such as acids in excess, pickles, &c. This is mischievous and cruel. The dreaded fatness is kept away, it is true; but at the expense of comfort and well being ever afterwards. The stomach is irreparably injured; blood is not made in sufficient quantity nor of quality adequate to the wants of the several parts of the system. Hence the skin becomes pale and the lips are blue. If the change have been sudden, the skin, in place of gradually accommodating itself to the diminished size of the parts beneath, which by its elasticity it is able to do in health, either falls into folds and puckers or is loose and destitute of its wonted smoothness and polish.

The season of belleship over, and it may be the duties of maternity devolving on her, the victim to bad taste, who was so eager to make herself thin, will wish most earnestly for her former good appetite, and good digestion, nor fear even if somewhat of embonpoint should follow. But vain will be her wish, if the practices already adverted to, in the large and long use of acids and of indigestible substances containing acid, have been followed. The chances of salutary change, even after reform is begun, will be much less if, for the sake of exhibiting a delicate waist, tight lacing has been added to the other enormity in question. The injury to the stomach and liver, and to their functions, and to the lungs and the circulation, though not perhaps beyond recovery, will yet be of long duration.

If a person suffer from obesity, either by its impeding the requisite pleasurable freedom of movements or its unseemly appearance, the cure is to be sought for by a perseverance in the following course: 1. The use of food in moderate quantities, at long intervals, and with a restriction in the amount of fluid as well as of solid; 2. Full exercise, to the extent of producing fatigue; 3. Engrossing mental occupation, so that the brain shall also be somewhat fatigued by its peculiar exercises as were the muscles of the trunk and limbs by theirs; 4. Sleep, short of its customary period, which implies of course very early rising. An

active thinker and a short sleeper, a long walker and a spare feeder will seldom be burthened with flesh or require compassion for obesity.

In some countries, especially in the East, moderate fulness is considered beautiful; and the extreme of obesity has found royal admirers, in the persons of the kings of some of the Sandwich Islands.

That corpulency, to even an unwieldy extent, may be brought down within comfortable limits we have many well attested proofs. Dr. Cheyne, who weighed thirty-two stone (14 lbs. to the stone) reduced himself one third, and enjoyed good health till the age of seventy-two. Numerous instances of the kind are mentioned, where journals of gradual reduction were kept. The following is an abstract of one of them, in the case of a person, who, on the 17th of June, 1820, weighed twenty-three stone two pounds.

June 17th,	-	-	23	stone	2	pounds.
July 27th,	-	-	21	"	10	"
September 10th,	-	-	20	"	7	"
October 10th,	-	-	19	"	3	"
November 10th,	-	-	18	"	11	"
December 10th,	-	-	18	"	4	"
December 25th,	-	-	18	"	1	"

In another case, attended by Dr. Gregory of Edinburgh, the patient weighed twenty-three stone, and by a regular system of diet was brought down

to fifteen stone, being a reduction of a hundred and twelve pounds. In this instance brown bread with a certain quantity of bran in it was employed. A baker in Pye Corner, (London,) weighed thirty-four stone, and would frequently eat a small shoulder of mutton, baked in his oven, and weighing five pounds: he, however, persisted for one year to live upon water gruel and brown bread, by which he lost two hundred pounds of his bulk.

LEANNESS.—We are not to suppose that there is a uniform proportion between the quantity and quality of food eaten and the size and corpulence of the individual. Some of the most ravenous eaters have had the leanest bodies, and some of the most rotund and fat figures have been moderate in their living.

There is no better, and perhaps it should be added less easy, means of removing leanness and its straight lines and furrows than cheerfulness and a composed mind. To laugh and grow fat, is one of the truest proverbs; but in this utilitarian age, in which children, even, are crammed with cakes and confectionary in one establishment, and with chosen morsels and essences, or, more vernacularly expressed, with the odds and ends of all the sciences in another, this is now-a-days seldom witnessed. Then, in after life, the thirst for gold and office among men, and the craving for dress and gewgaws

and show among women, and the heart-burnings and anxieties respecting their social position among all; liquor and tobacco with one sex; coffee and tea with the other; indolence alternating with over exertion in both, induce a state of feeling most incompatible with that which would prompt to laughter and incline us to grow fat.

Various expedients, in addition to an improved diet, have been resorted to, for the restoration of lean persons to a better case; but amongst the most singular which we have on record is that of flagellation. Galen says, that horse dealers having been observed to fatten horses for sale, by flogging them, an analogous method might be useful with spare persons who wish to become stouter. He, also, mentions slave-dealers who employed similar means. Suetonius informs us that Musa, the favorite physician of Augustus, used to fustigate him, not only to cure him of sciatica, but to keep him plump. Meibomius pretends that nurses whip little children to fatten them, that they may appear healthy and chubby to their mothers. No doubt but flagellation determines a greater afflux of blood to the surface, and may thus tend to increase the circulation, and give tone to parts which would otherwise be languid.*

As flagellation is now out of fashion and fallen

* MILLINGEN'S *Curiosities of Medical Experience*.

into disuse, both in church and state, prisons and schools, we may be content to take the hint which the practice furnishes and obtain the application of the philosophy by gentler methods. There is no doubt, that a greater determination of blood to the surface will give fulness and activity of growth to the skin and soft parts beneath. Hence the advantage, in reference to the point which now engages our attention, apart from the considerations on which the custom has been already recommended, of the use of the warm bath and, subsequently, of even rough and assiduously continued friction of the skin.

EFFECTS OF PRESSURE ON THE CONTOUR OF THE BODY.—The frame-work of the body consists of the bones, and the size and proportion of the limbs and external parts are given by the muscles which cover this frame-work, or the skeleton. The fulness of form and outline, in which the jutting muscles are covered and the spaces left between them are filled up, is communicated by the adipose and cellular tissues, as already described. But the well defined contour and finely rounded forms depend on the skin, which has sufficient elasticity to allow of its yielding to the distension from growth or temporary enlargement of parts, and to resume its former state when the distending cause ceases to act and the parts have returned to their pristine dimensions. Its power of accommodation is evinced

also in its gradual retraction, in cases of diminished embonpoint, so that it still closely invests and gives a finished outline to the parts beneath. Where the change of size is sudden, however, as from distension by tumor or swelling, the skin is not elastic enough to prevent its being unduly stretched and becoming very tense, with the loss of its natural softness; or to fall into wrinkles and folds, after a sudden removal of the subjacent parts, in violent disease.

The elasticity of the skin, and it may be added, of the soft tissue beneath is best maintained by the means already described, as those most favorable to the health and beauty of this part. Whatever gives vigor and animation to the body will contribute to the increase of this property, and also of the vital tone or tonicity, which on this account are most active and manifest in youth and the prime of life. They are best preserved by that middle state of fulness of habit alike removed from obesity and from emaciation. The skin long distended in very fleshy persons loses its elasticity and tone, and any diminution of size, unless by regular training, leaves it in folds or puckers. Long retracted, in thin persons it does not yield with regularity and entireness to a rapid increase of flesh, and exhibits lines and creases, and shadows, which are unpleasant breaks on what ~~ought~~ to be a smooth and polished surface.

With old age comes diminished elasticity and vital tone of the skin and the consequences just mentioned.

It would be most fortunate if we could with propriety dismiss this subject without any additional remarks, and especially without the necessity of censuring a practice, sanctioned by fashion, which anticipates the worst effects of disease and of old age, in destroying the elastic and tonic powers of the skin, removing thereby the proper and equable compression of the contained parts beneath and disfiguring the beautiful contour and undulating lines of beauty. I refer now to the artificial pressure exerted on different parts of the body by busks and tight lacing, and by padding. The inevitable effect of these applications is to destroy the elasticity of the skin, or the power of accommodating itself to the varying fulness of the soft parts, and even of giving these the requisite support at any time. But, not only is the vital power of the skin enfeebled, the elastic cushion of fat and cellular tissue beneath is removed by the continued pressure, and the undulating outline and desired fulness of the external forms are destroyed. In place of roundness, ever essential to beauty, there is flatness. Poorly is the deficiency in this respect compensated for by additional fulness of the parts immediately external to or beyond the line of compression. If the skin in the former case

suffers by pressure, it is injured in the latter by being constantly relaxed. In both cases it is deprived of that exercise of its properties which is absolutely necessary for their retention and activity. This is more particularly evident where the person is fleshy and with naturally a full contour of the bust. The pressure on the waist and lower part of the bosom causes an unnatural protrusion of the latter upwards, so as to destroy both its natural convexity of figure and to interfere with and in a great measure prevent those gently undulating lines and gradual change of surface from the neck to the breast and shoulders. Growth prevented at the waist and central region of the body goes on now with additional activity in the upper part of the breast, shoulders and neck, which in consequence acquire a development unfavorable to symmetry, and both unsought and unwished for by the victim of fashion herself. A good idea of the inequality of growth and unseemly appearance caused by tight lacing or bandaging of the waist may be formed by witnessing the effects of a tight ring or iron girdle on the trunk of a tree or stem of a plant. There will be depression of the part covered by this latter and unnatural growth or excrescences above and below. To the eye of taste as well as to that accustomed to natural proportions, how much more pleasing would be the sight of the several parts of the bust left in their relative

position, with their appropriate fulness and contour, and yet deriving just that artificial aid from dress which should aid the elasticity of the skin. Garments of a suitable texture and shape might be contrived so as to exhibit without deforming, and to even set off to advantage, without discord of proportions, the entire contour of the bust.

If the bosom be full and expanded it will in its proper position harmonise with the natural size of the waist and not be merged in the neck and shoulders. A bust thus formed may not by all be regarded as a standard; but it will at least please by its harmonious proportions and will represent advantageously one of the types of beauty, that in which nutrition and a consequent fulness of all the forms predominate. Its superiority over any moulding by fashion would be admitted by all of either sex, if the two figures divested of drapery, that on which corsets have been long used, and that left to its natural growth and proportions, were copied on canvass or in marble. The proper contrast would be to place the figure made by fashion with its long, straight, flat, and disproportionately narrow waist and upforced breasts, beside the Venus de' Medici, or the Juno of the Capitol, or Diana, or any admitted beautiful female, painted by a Titian or a Vandyke, a Guido or a Rubens. Every spectator, whilst admiring the one, would turn away with ill concealed dislike from the other.

Were the fashion now reprobated merely a masquerade dress, put on for a particular occasion, we might regard it as harmless although silly. But when we know that it permanently injures and deforms, by preventing the restoration of the skin to its natural elasticity and of the several parts to their proper form and contour, we must regard it with sentiments of dislike for its mischievous effects, and of contempt for its being opposed to good taste. A lady who, after having been, we will suppose, a willing victim to the cruelty and barbarism of tight lacing for some years, should consent to abandon the fashion, can no longer expect a restoration of her natural and graceful figure. This is well known to the suffering party, and it is made a plea for not attempting a reform, which on the score of beauty might not, perhaps, be so material; but which, on that of health, for reasons already assigned and for others to be given in the sequel, is of paramount importance.

We have in the preceding remarks supposed that there was obvious plenitude of bust. But if the young person be of a thin frame and yet growing, the evils from the artificial compression by busk and corsets are still greater. The gradual swell and roundness of the bust, from the requisite fulness of the breasts and shoulders, is prevented by the early and continued pressure, which acts higher up still

than in the case first supposed. The shoulder blades are unduly brought together; and besides, they are not adequately covered with the muscles and the fatty and cellular tissues, by which a graceful undulation of contour is acquired for these parts. Not only is the growth prevented, but there is an actual removal of the soft parts by the vital process of absorption, called into activity by pressure. In front, the breasts being similarly pressed on by the busk between and corsets over them, are also prevented from expanding; and the bust in place of its full rounded contour, represented by a succession of circular, spherical, and elliptical lines, is flattened in front and behind. It pains the observer from its appearance being associated with deficient amplitude of chest and feebleness of respiration; and by its suggesting a deficiency in those parts which, hereafter, when the female has become a mother should be the fount of the pearly stream of nutriment for her offspring.

The artifice of padding, so as to give an appearance of fulness to the bust when the breasts are deficient in their development, is productive of bad effects, by increasing the defect which it was intended to conceal if not to remedy. This padding, by its pressure on the breasts, really prevents their growth, and even diminishes their original bulk.

Surgeons are well aware, and constantly practise on a knowledge of the fact, that one of the most

effectual means for the removal of tumours or prominences of any kind on the human body is by a graduated pressure. Bone itself will disappear under this agency, by what has been called the vital process of absorption.

If the physician or surgeon were specially requested to undertake measures having for object the removal of the protuberance of breasts and their entire flattening, he would make use of compresses (pads) and pressure, either by a roller or bandage passed round the parts, or by corsets as commonly worn.

The proper aids to a suitable development of the bust are in some respects the very reverse of those usually had recourse to. The soft parts should not either be thrust upwards out of their natural position and direction, or compressed by padding; but left entirely free from pressure of any kind, or in any direction. Their growth will be encouraged by all the means adapted to the promotion of health and in a more especial manner by wholesome food, fresh air, and active exercise. Those sports, in which the arms are freely moved in every direction, and by which the chest is expanded, contribute not a little to the desired amplitude and roundness both of the breasts and shoulders. Direct excitation of the skin and tissues beneath, so as to invite an afflux of fluids and cause a consequent fulness, is obtained by warm clothing, warm bathing or sponging

with warm water, followed by moderate friction continued for some time.

Other varieties of pressure, all of them detrimental to health and some of them to pleasing outline of form and graceful carriage, are caused by tight shoes, tight garters, the upper part of the sleeves which press at the same time on the arm pits and cause swellings of the glands in those parts; tight cravats or collars, and hats too small for the head. I but mention these now, as I shall have occasion to speak of them hereafter, under the heads of movements and expression. In reference to the subject now under illustration, it cannot, however, have escaped the notice of the most superficial, that tight and very low shoes often worn to make the feet appear less large than they really are, have a most disfiguring effect. The undue pressure on the sides and toes causes a swelling or actual puffiness of the upper part of the foot and that contiguous to the ankle, so as to destroy the proportion and symmetry which even a large foot may exhibit when not distorted by false fashion.

OF THE FIGURE AND CONTOUR.—During youth and among civilised nations, woman is distinguished by the softness, the smoothness, the delicacy, and the polish of all the forms, by the gradual and easy transition between all the parts, by the num-

ber and the harmony of the undulating lines which these present in every view, by the beautiful outline of the reliefs and by the fineness and animation of the skin.*

A certain degree of plumpness is appropriate to the sex. It evinces an abundance of that soft tissue, the cellular or reticular, which is not only largely distributed under the skin, but is found also interposed between all the internal organs as well as in the neighborhood of the joints and all the parts, the pressure of which on each other would be productive of injury to the health. A woman thus constituted is less liable to suffer from irritation or disease of the internal organs during those notable changes in the state of maternity, in which the organs are exposed to great compressions and distensions.

During the third stage or turning period of life a woman, who has retained the healthy exercise of her digestive functions, and enjoyed relative freedom from the shock of strong and contending emotions, sometimes acquires an increase of plumpness and displays even a degree of beauty, mature though it be, to which owing to her meagreness in early life she had been heretofore a stranger.

* ANALYSIS OF BEAUTY.—For the descriptions which follow, of the different styles of beauty, I am mainly indebted to this work.

Gradually with advancing age the polish and firmness of the skin and flesh are lost; the natural prominences and all the forms lose their roundness and softness, and acquire angularity and hardness.

There are well marked varieties of the female form and of fulness and roundness of outline, according to the predominance of the nutritive, the locomotive and the intellectual functions. It is in the first that we expect always to find the highest degree of development of the external forms; from the greater abundance in them of the cellular and adipose tissues. In a woman of this variety, the face is generally full and rounded; the neck is rather short and by the gentlest curvature forms an almost insensible transition between the body and head; the shoulders are softly rounded, and owe any breadth they may possess rather to the expanded chest than to any bony or muscular size of the shoulders themselves; the bosom, a vital organ, in its luxuriance seems to protrude laterally on the space occupied by the arms; the waist, though sufficiently marked, is, as it were encroached on by that plumpness of all the contiguous parts which results from the activity of the nutritive system. But the locomotive organs, the limbs and arms, tapering and becoming delicate, terminate in feet and hands, which compared with the ample trunk are peculiarly small.

This variety is most frequently met with in

women of short stature; and is especially evident after they have become mothers. It is in it that the light complexion prevails, so that the rose and the lily are exquisitely blended; and there is at the same time in persons thus constituted a profusion of soft and fine flaxen or auburn hair.

The variety of beauty characterised by a predominance of the locomotive system, shows itself in a woman whose face is generally somewhat bony and oblong; the neck long and tapering; the bosom of moderate dimensions; the waist enclosing smaller nutritive organs, is remarkable for fine proportion and resembles, in some respects, an inverted cone; the arms as well as the lower limbs being formed chiefly of locomotive organs are rather long and moderately tapering; the hands and feet are moderately small. The complexion, owing to the inferior activity of the nutritive system is often rather dark; and the hair is frequently dark and strong. The whole figure is precise, striking, and often brilliant. From its proportions, it seems almost aerial; and we would imagine, that if our hands were placed under the lateral parts of the tapering waist of a woman thus characterised, the slightest exertion would suffice to make her rise and float in mid air.

The arms of woman are shorter than in man. As these members are well marked in beauty of

the locomotive system, they may be more fully considered here. The arms, and especially their extremities, are susceptible of a degree of beauty of which we have few examples. Their bases, the bones, ligaments, and muscles belong to the locomotive system; and their characteristic beauty consequently depends upon its proportions; but to the nutritive system, on which the soft tissues that cover and clothe, as it were, the muscles, depend, are owing the circumstances that in woman, the arm is fatter and more rounded, has milder forms, and more flowing and purer outlines. The hand in woman is smaller, more plump, and softer, and whiter. It is peculiarly beautiful when full; when it is gently dimpled over the first joints; when the fingers are long, tapering towards the ends; when the other joints are marked by slight reliefs and shadows; and when the fingers are delicate and flexible. Beauty of the hand becomes the more precious because it is the principal organ of that sense which may be considered as the most important of all.

The women of Rome, we are told, present beauty of the shoulders in the highest degree, when they arrive at that period of life in which plumpness succeeds to juvenile elasticity.

The Greek or Ionian women, whose arms were of so perfect a form, owed this beauty in a great

measure to the freedom of these parts from the pressure and ligature of modern dress and their consequent ability to exercise them freely.

It might be thought to be pushing physiognomy too far to allege that the form of the hand not only often announces the occupation of the person to whom it belongs, but sometimes even her particular capabilities. There certainly are, says Walker, hands that we may call intellectual; and there are others that we may call foolish or stupid. The reader will excuse me for inability to define these distinctive peculiarities.

The ancients attached more importance to the form of the feet than we do at this time, probably owing to the fact of these members being constantly exposed to view. The philosophers did not neglect it in the general view of the physiognomy; and the historians as well as poets made mention of their beauty, in speaking of Polyxene, Aspasia, and others; as they did of their deformity, in describing the emperor Domitian.

In woman the joints and especially those of the extremities are small. The elbow joint is softly rounded; and the various joints of the fingers are marked chiefly by little reliefs and faint shadows.

The finest model of beauty of the locomotive system, is in the statue of the Grecian Diana, represented with one hand on her quiver just about

to draw an arrow, and the other seizing the horn of a bounding stag.

In the beauty distinguished by predominance of the intellectual or thinking system, the greater development of the upper part of the head gives it a pyriform appearance; the face is generally oval; the high and pale forehead announces the excellence of the observing faculties; the intensely expressive eye is full of sensibility. In the lower features of the face modesty and dignity are often united. There is not the expanded bosom, the general plumpness, or the beautiful complexion of the first species of beauty; and in place of its elegant proportion of the second, we see easy and graceful motion. The whole figure is distinguished by intellectuality and grace.

Be it said, however, that this kind of beauty is less adapted to woman than the first. It is not the intellectual, but the nutritive system, which is and ought to be most developed in woman.

The best illustration of the union of the several varieties which render the beauty of the thinking system, perfect, is the Minerva of the Giustiniani Gallery at Rome.

DEPENDENCE OF THE FORMS ON NUTRITION.

In summing up the chief facts and illustrations

on the subject of beauty of the skin, and fulness and harmony of the external forms, as displayed in the rounded and waving outline of the several parts, we see that the chief condition for the possession of these qualities is in the health of the nutritive system. By this we are to understand that series of functions constituting digestion, assimilation, circulation of the blood, respiration, and the various secretions and excretions.

Of these, the first is digestion, for the due performance of which, the stomach must receive food of an appropriate kind, enough to occupy without fatiguing it. The gastric change, when complete, results in the formation of a semifluid matter which is taken up and received into numerous small vessels, to be converted into chyle. This fluid is then carried onwards and collects into fewer and larger vessels, and finally into one duct called the thoracic, by which it is poured into a bloodvessel near the heart. The chyle thus mixed with the blood, at least that portion of it called venous, and which, as already described, is returned from all parts of the body, enters with this latter into the right cavities of the heart. From these it is propelled into the lungs by the contractions of the walls of the cavities, and, as before stated, is minutely distributed by very small, and in some instances, imperceptible vessels under the lining membrane of the lungs, through the medium of which it is exposed

to the atmospherical air, taken in during inspiration. The blood now assumes its rich vermilion tint, and acquires those properties by which, when it is returned to the left cavities of the heart and transmitted by the contraction of their sides into the arteries and thence distributed to all parts of the body, it becomes fitted to vivify and nourish them. Part of the blood, having reached the organs and tissues, continues its course through them, passing from the minute arteries into minute veins and thence into larger veins, until it is finally emptied, in volume, into the right cavities of the heart. But another part of the blood remains in the organs to which it was distributed by the arteries. Some of it becomes solid and assumes the appearance and nature of the tissue in which it is deposited. In this way the growth of the body is accomplished. Whether it be muscle, or bone, or fat, or cellular tissue, each and all are nourished and replenished from the blood. Of this fluid remaining in the organs, that which is not used for their direct nutrition and growth, undergoes peculiar kinds of changes termed secretions, by which it is converted into new fluids destined for specific purposes. Thus from blood brought to the liver, bile is formed; from that carried to the glands at the angles and under part of the jaws, saliva, &c. These new products are used in the digestive function; the saliva mixing with the food in the mouth, the

bile with that which has been changed by the stomach and carried into another portion of the digestive canal.

There are other fluids formed out of the blood; such as sweat on the skin, the product of respiration, in the lungs, &c., which must of necessity be discharged out of the body; for if retained, serious disturbances in the animal economy and even alarming and fatal diseases would ensue. These fluids are commonly called excretions.

A very slight acquaintance with physiology shows that on the ease and completeness with which digestion, the first of the series of the nutritive functions, is performed, will mainly depend the harmonious condition of the other functions, viz: assimilation, respiration, circulation, and the secretions including nutrition proper, or the deposit of nutritive matter from the blood in the frame-work of the tissues. Crude aliment or too great a mixture of articles of food will fatigue and disturb the stomach, and prevent this organ from fitting it to be changed into chyle. Or if this latter be formed, it will be in small quantity, not enough to supply the blood in return for the waste of this fluid by the processes already described. Even when formed, the chyle may be relatively poor, or retain somewhat of the peculiarities of the food, and in this way affect the blood. If the blood be impoverished, vainly can we expect to see its possessor exhibit

either the hue of health or fulness of the forms, and the swelling and rounded outline of beauty.

There is one other consideration connected with the subject of digestion, which cannot be presented in fewer words and more to the purpose than in the language of a lady, who has addressed a work to her own sex on the main topics, which are interesting to them, viz: behavior, dress, health, divisions and improvement of time, conversation, visits, travelling, and mental culture.*

“I cannot dismiss this part of my subject,” says Mrs. Farrar, “without a few observations on the importance of a daily evacuation from the bowels. The practice of taking medicine to effect this should be avoided; but no pains should be spared in regulating the diet and exercise so as to obtain it. If all mothers made a point of establishing regular habits in childhood, it would not be necessary to notice the subject here; but knowing how carelessly most young persons treat the subject and that some even consider it a piece of refinement and a privilege not to pay daily attention to this function of the body, I feel it incumbent upon me to point out the evil consequences of such a course.

“It may startle some, who thus neglect themselves, to know that they carry in their face the proof of their bad habits; and that a medical man has said, he could distinguish, in a large company, all those girls who were inattentive to their health

* *The Young Lady's Friend* by MRS. JOHN FARRAR, Boston, 1838.

in this particular. He says, he knows them by the state of their complexions; and he longs to remonstrate with them on the impolicy if not the sin, of so maltreating their systems and spoiling their good looks. To those who have right views of the subject, there is something the very reverse of refinement in such conduct; and young ladies would certainly avoid it, if they were aware of all the consequences. Besides the indirect injury to the health, and consequently to the beauty, of all, it has a direct effect unfavorable to the complexion; it, also, makes the breath offensive, and sometimes affects the whole atmosphere of a person; it is, moreover, a frequent cause of eruptions of the skin. If this be not already your mortifying experience, let me persuade you to comply with the laws of your being, before you have felt the chastening which will sooner or later follow their infringement."

Not only are the looks injured by this torpid state of the alimentary canal, or constipation, but the health is in various ways affected and many important functions deranged; for the relief of which a female is too apt to have recourse to deleterious nostrums. The tone of the spirits and the activity of the intellect are also lowered by the same cause.

CHAPTER III.

OF ATTITUDES AND MOVEMENTS—EXERCISE AS A
MEANS OF HEALTH AND OF GRACE.

THE most important division of my subject is reached in this chapter. It is not merely a consideration of beautiful proportions to be preserved and graceful movements to be acquired, but of deformity to be prevented, which is now to engage our attention. If evils of great moment are pointed out, the remedy can, happily, be made equally manifest. There is a standard before us by which to measure the accuracy of our opinions and to test the correctness both of our advice and censure. The facts on this occasion cannot be evaded nor denied, however much their value may be underrated, and the inferences from them ridiculed, in the same frame of mind with which 'one may be supposed, by a horrible perversion of the moral sense, to find amusement at the sight of a fellow creature brought to the rack, on which his joints are dislocated and their ligaments torn. One cannot but wish that our nursery associations between the bony frame-work, or the skeleton of

the human body, and death and decay were broken up; and a rational acquaintance with medical mechanics substituted in their stead. Great would be the gain of useful knowledge to the young of both sexes, if pedants and pedagogues were to present, in place of a wearisome neology, illustrations of the lever, the pulley, and the wedge, of the arch, the hinge, &c., in the human skeleton; and to show how wonderful the elasticity and flexibility evinced in the structure of the spine; and the various examples of the laws of the centre of gravity in attitudes and movements.

A very brief study of the locomotive apparatus at rest and in action would prevent, or if they had been acted on, shame the enactors from persisting in them, the various privations and observances by which the body is placed and retained in wearisome postures and cheated of proper exercise. A skeleton should be a part of the little museum of every seminary of learning for either sex: it certainly is an appropriate addition to any philosophical apparatus; and, as respects direct personal advantage to the scholar, should be preferred to the air-pump, or electrical machine.

Into a detailed or even systematic description of the parts for support and motion in the animal economy, I cannot be expected to enter on this occasion. Enough will be introduced, however, to enable the reader to understand the practices to be

pursued and those to be avoided, in the various attitudes and movements and regular exercises of the body.

THE BONES.—The solid frame of the human body consists of a series of bones variously joined to and connected with one another. In some instances, their union is so intimate that they seem to form but one bone, as the skull or cranium, which in fact consists of eight bones. In others, as at the wrist and foot, they are so tied to each other and connected by interlacing ligaments that they seem to form but one structure, although they have a slight motion on each other.

The head, which consists of the skull and bones of the face, rests on the *spine*, back bone, or *spinal or vertebral column*, as it is variously called. The spine is formed of a series of bones (*vertebræ*) which are hollow in their centre and constitute by their junction a long canal, in which the spinal marrow is contained. The spinal marrow is continuous with the brain above, which is contained in and protected by the skull. The figure of the back bone examined laterally is that of an italic *f* being waved or curved in different directions. It becomes, that is to say, the several bones of which it is made, become wider and present more surface as it descends until it is locked in as a wedge between the two bones, the haunches, and it then tapers off into a

point. It may be said in this respect to represent a double pyramid, the base of the upper one, which consists of twenty-four separate bones or vertebræ, is at the junction of the last of these with the bone that runs down between the haunches, and its apex is at the neck where it is joined with the skull; the base of the lower pyramid is in direct apposition with the other, and its apex is at the very extremity of the bone already mentioned or in other words at the very lower end of the spine. The vertebræ composing this last portion, or the inverted pyramid, are so closely united as to form but one bone, which is technically called *sacrum*. It must be obvious, therefore, that this *sacrum* is both a continuation of the spine and is the back part of that series of large and strong bones, the haunches, which meet in front and constitute an irregular cavity called pelvis. The weight of the spine proper and of the parts, which we shall soon see are connected with it, is borne directly by the lower portion of it or the lower pyramid, the *sacrum*, as more immediately in the line of the centre of gravity. But this weight is also transmitted in a very great degree to the bones on each side of the sacrum, owing to their close union, we might call soldering; just as a weight resting on one portion of a horizontal circular machine is borne to a certain extent by the whole of this circle. Were it not so, the part on which the weight immediately rests

would be too weak for its support and would be detached or broken off from the remaining and larger part of the circle. The *sacrum* or lower part of the spine, that which we have seen serves as a support to the upper, larger, and moveable part or spine proper, being situated between the haunch bones on each side transmits equally to them the weight with which it is loaded. From these bones the weight is transmitted to the thigh bones, one on each side, which are connected with the haunches by a strong joint. Thence the weight is transferred to the great or inner bone of the leg, and from it to the arch of the foot, the two ends of which are chiefly the lower portion of the heel and the ball of the great toe.

The above is the direct line of gravity from the skull or cranium to the feet, if we suppose them drawn close together and resting on the ground. But other important bones are joined, laterally, to the spine, which supports them indirectly and transmits their weight to the bones beneath it, as already described. Those now referred to are the ribs, twelve on each side, which at one end are joined, by articulation, to the back bone or spine, and at the other, in a similar manner, to the breast bone in front. More correctly, we should say, that seven on each side are joined to the breast bone: the ends of the others are left free. The first seven are called the true, the other five the false ribs. The

portion in front of each rib is cartilaginous, and hence is endowed with elasticity. The ribs increase in length successively from the first to the seventh, and from this latter they diminish in length.

It is in the cavity, the frame or outline of which is formed by a portion of the spine behind, of the breast bone in front, and of the ribs on each side, that the lungs and heart and the ramifications of the windpipe formerly described, and the passage to the stomach are contained. From the lower part of the breast bone and the ends and borders of the lower ribs, and passing backwards to the spine, is spread a fleshy and tendinous partition of a vaulted form, called midriff, or technically, diaphragm, which separates the organs, just named, in the cavity of the chest or thorax, from the other important ones chiefly for nutrition; as the stomach, liver, spleen, intestines, kidneys, &c. These last are contained in the cavity (abdomen) formed by the midriff above, by the inclined inner walls of the haunch bones or the pelvis below, by the spine and broad muscles on each side of it behind, and by broad sheet-like muscles, in front; the whole being covered with some fat and cellular tissue and the external tegument or the skin.

The weight of all these organs, viz: the lungs for respiration, and the heart, the central or motive power of the circulation; and those other organs for diges-

tion, absorption of chyle, secretion, &c., &c., is borne, in part, by the spine, which has a tendency in consequence, to be bent forwards, and in part, directly, by the circle and sides of the cavity formed by the haunch bones on each side and the sacrum behind. The whole weight, however, is transmitted, when the body is erect, to the bones of the lower extremities.

There are, still, other bones, which have a more indirect connection with the spine than those already described; but which are the instruments, under the guidance of his mind, of man's superiority over all other animated beings, and the means whereby he fashions inanimate nature to suit his views of usefulness, taste, or caprice. These are the bones of the arm and hand on each side, or of the upper extremities, which consist of the shoulder, the upper bone between it and the elbow, or the arm proper, and the two lower bones between the elbow and wrist, or the forearm, and the series of bones which make up the wrist, the body of the hand, and the fingers.

The shoulder consists of two bones, the shoulder blade or *scapula*, and the *clavicle* or collar bone. The shoulder blade is placed upon the upper and back part of the bony chest or thorax, and occupies the space between the second and the seventh ribs. It has no direct connection, by joint or articulation, with the chest, from which it is

separated by an intervening layer of muscles, as upon a cushion, and over the smooth surface of which it glides. Its anterior surface is concave, and corresponds to the convexity of the ribs. On the external surface runs a ridge, or spine, as it is called, which ends in a projection or process termed the acromion. The figure of the shoulder blade is triangular, the shortest border being uppermost. At the anterior angle of the bone there is a shallow, oval depression covered with cartilage and deepened by a cartilaginous margin. Into this cavity is received the head of the bone of the arm, the other end of which is articulated, at the elbow, with the upper ends of the two bones which make up the forearm.

The second bone of the shoulder, the clavicle or collar bone, is long and slender, with a double curve, and in the middle projects a little forwards, so as to give a slight convexity of outline to the top of the chest and the bottom of the neck. It is attached by one end to the breast bone and by the other to the shoulder blade by moveable joints.

The collar bone serves to sustain the upper extremity or the arm, forearm, and hand; and to connect it with the chest as well as to prevent it from falling forward on this latter. This bone, also, affords a fixed point for steadying the upper limb in the performance of its various functions.

The head or upper round end of the arm (*hu-*

merus) received into the cavity of the shoulder blade and the two united by ligaments forms the shoulder joint. This latter is what is termed a ball and socket joint, one of the peculiarities of which is to admit of free and extensive motion in every direction; upwards, downwards, backwards, and forwards.

Let us now return to the *spine* or *vertebral* or *spinal column*, as it is generally termed, which merits a farther consideration. From the description hitherto given we see that it affords a support and buttress to other bones. It sustains the head; it is a buttress to the ribs; through the sternum or breast bone, and the ribs, it is also a buttress to the upper, and through the pelvis to the lower limbs. So far we can understand how it is firm, rigid and strong; and from its consisting of a number of separate bones resting on and articulated with each other, that it should also have some degree of flexibility. Each separate bone or vertebra yields to some extent, which though slight in a single bone, becomes considerable in the twenty-four. But a different or at least modified mechanism is required for the spine to display its appropriate flexibility and elasticity. This will be readily understood by what follows. If I engage a little in detail, I intreat the reader's attention, and can assure that no description of structure and of connection of parts is introduced which is not necessary to an elucidation

of the subject of attitudes and movements, and to an understanding of the necessity of having the body and limbs untrammelled by tight and ill-fitting garments, in order that it should be benefited by exercise.

The vertebræ of which the spine or back bone is formed were represented to be so many long rings resting one on the other. It would be more strictly accurate to say, that the anterior surface of each vertebra is convex and its posterior surface concave. From the two sides of this concavity there springs a long arch, which completes a ring, the cavity of which is filled up as already remarked by spinal marrow. The union of twenty-four of these rings forms a long canal in which the whole spinal marrow or nervous column, from the brain to the lower part of the loins, is contained.

But the upper and under edges of the arch just described form a notch, which, together with a corresponding notch in the contiguous vertebra, completes another opening rounder and smaller than the former, through which pass out laterally, on each side, the nerves from the spinal marrow, or the spinal nerves, to be distributed to all the muscles and to the skin, giving the former the power of contracting and the latter sensibility.

From both the upper and under sides of the arch project portions of bone termed articulating processes, because it is chiefly by them that the verte-

bræ are connected together, in such a way that the two upper processes of one vertebra are united with the two lower processes of the vertebra immediately above it.

It now remains to be seen by what contrivance the united vertebræ constituting the spine or the spinal column, or back bone, display that flexibility and elasticity with which it is endowed in so wonderful a degree.

Again, it is necessary to modify the description already given, in which it was said, as indeed is the case in the skeleton, that the vertebræ rest on one another. In the entire body, however, each vertebra is separated from its fellow by a substance of a peculiar nature interposed between them, termed the intervertebral substance, which partakes partly of the nature of cartilage and partly of that of ligament. This substance for about a quarter of an inch from its circumference towards its centre, is tough, strong, and unyielding; then it becomes softer, and is manifestly elastic; and so continues until it approaches the centre when it becomes pulpy and is again inelastic. The exterior tough and unyielding matter is for the firmness of the connection of the several vertebræ with each other; the interior softer and elastic matter is for the easy play of the vertebræ upon each other; the one for security, the other for pliancy. And the adjustment of the one to the other is such as to

combine these properties in a perfect manner. The quantity of the unyielding substance is not so great as to produce rigidity; the quantity of the elastic substance is not so great as to occasion insecurity. The firm union of its solid matter renders the entire column strong; the aggregate elasticity of its softer substance renders it springy.*

A rigid and immoveable pile of bones, in the position of the spinal column, on which all the other parts of the body rest, and to which they are directly or indirectly attached, would necessarily have rendered its movements stiff and limited; and every movement of every kind impossible but in a certain direction. That the movements of the body may be easy, free, and varied; that it may be possible to bring into play new and complex combinations of motion at any instant, with the rapidity of the changes of thought, at the command of the impulses of feeling, it is indispensable that the spinal column be flexible in every direction, forwards, backwards, and at the sides. It is equally indispensable that it be thus capable of yielding, without injuring either the spinal cord or the spinal nerves; without injuring the organs in the chest and abdomen; and without injuring the muscles of the trunk and extremities. The degree in which it possesses this power of flexibility, and the extent

* DR. SOUTHWOOD SMITH.—*The Philosophy of Health.*

to which, by cultivation, it is sometimes actually brought, is exemplified in the positions and contortions of the posture master and the tumbler. It is acquired by means of the intervertebral substance, the compressible and elastic matter interposed between the several vertebræ. So compressible is this substance that the human body is half an inch shorter in the evening than in the morning, having lost by the exertions of the day so much of its stature; yet so elastic is this matter that the stature lost during the day is regained by the repose of the night. The weight of the body pressing in all directions upon the spinal column; muscles, bones, cartilages, ligaments, membranes with all their vessels and all the fluids contained in them; the weight of all the component parts of the head, trunk, and extremities pressing, without the cessation of an instant, during all the hours of waking, upon the intervertebral substance, compresses it; but this weight being taken off during the night, by the recumbent posture of the body, the intervertebral substance, in consequence of its elasticity, regains its original bulk, and of course the spinal column its original length.

But the flexibility acquired through the combined properties of compressibility and elasticity is exceedingly increased by the action of the pulpy and inelastic matter in the centre of the intervertebral substance; this matter serving as a pivot to

the vertebræ, facilitating their motion on each other. Its effect has been compared to that of a bladder partly filled with water, placed between two trenchers. In this case the approximation of the circumference of the two trenchers on one side would immediately displace a portion of the water on that side, which would occupy the increasing space on the other, with the effect of facilitating the change, in every possible direction, of the position of the two trenchers in relation to each other. To this effect, however, it is indispensable that the matter immediately around this central pivot should be, not like itself, rigid and unyielding, but compressible and elastic. It is an interesting fact, that since this illustration was suggested, it has been discovered that this very arrangement is actually adopted in the animal body. In certain animals, in the very centre of their intervertebral substance, there has been actually found a bag of water, with a substance immediately surrounding it so exceedingly elastic, that when the bag is cut, the fluid contained in it is projected to the height of several feet in a perpendicular stream.

But besides securing freedom and extent of motion, the intervertebral substance serves still another purpose, which well deserves attention.

Firmness and strength are indispensable to the fundamental offices performed by the column, and to endow it with these properties, we have seen

that the external concentric layers of the intervertebral substance are exceedingly tough, and that they are attached to the bodies of the vertebræ, which are composed of dense and compact bone. But than dense and compact bone, nothing can be conceived better calculated to receive and transmit a shock or jar on the application of any degree of force to the column. Death may result from concussion, that is, the communication of a shock to the brain through the bones of the skull, without any change in the appearance or substance of the brain itself. A special provision is made against this evil, in the structure of the bones of the skull (*cranium*) by the interposition between its two compact plates of the spongy substance called *diploe*, and this is sufficient to prevent mischief in ordinary cases. The brain seldom suffers from direct violence; but every hour, in the ordinary movements of the body, as in walking and much more in the violent ones of running, jumping, &c., which it occasionally makes, a degree of force is applied to, or a jar is received by, the spinal column and through it transmitted to the head, which would inevitably and instantly destroy both the spinal marrow or cord and the brain. The evil is obviated partly by the elastic, and partly by the non-elastic properties of the matter interposed between the several layers of compact bone. By means of the elastic property of this matter the head rides upon

the summit of the column as upon a pliant spring, while the canal of the spinal marrow remains secure and uninvaded.* On the same principle thin pieces of lead or slate are interposed between different pieces of marble in a column, to prevent the edges (technically called arrises) from coming in contact, as they would in that case chip or split off.

But there is another very curious provision for the protection of the brain; in the curved form of the spine. If a steel spring, perfectly straight, be pressed between the hands from its extremities, it will resist, notwithstanding its elasticity, and when it does give way, will be with a jerk.

Such would be the effect on the spine if it stood upright, one bone perpendicular to another; for then the weight would bear equally, the spine would yield neither to one side nor to the other; and consequently there would be a resistance, from the pressure on all sides being balanced. We therefore see the great advantage resulting from the human spine being in the form of an italic *f*. It is prepared to yield in the direction of its curves; the pressure is of necessity more upon one side of the column than on the other; and its elasticity is immediately in operation without a jerk. It yields, recoils, and so forms the most perfect spring; ad-

* *Op. citat.*

mirably calculated to carry the head without a jar, or injury of any kind.

The most unhappy illustration of all this is the condition of old age. The tables of the skull are consolidated by the removal of the intermediate spongy structure; and the spine is rigid. If an old man should fall with his head upon the carpet, the blow which would be of no consequence to the elastic frame of a child, may prove fatal to him; and the rigidity of the spine makes every step which he takes vibrate to the interior of the head, and jar on the brain.

The two surfaces of the spine, the anterior and posterior, present a striking contrast. The anterior surface is smooth and rounded in its whole extent, as that against which rests or glides so many of the important organs already mentioned. It is broad in the region of the neck, narrow in the region of the back, and again broad in the region of the loins. It presents three curvatures; the convexity of that of the neck being forwards, that of the back backwards, and that of the loins again forwards.

From the posterior surface of the spine, which is every where irregular and rough, or rather from each of the vertebræ composing it, there is a projection, sharp and pointed like an elongated spine, and called spinous process; and hence the name given to the whole chain of bones. These pro-

cesses afford fixed points for the action of powerful muscles. Extending the whole length of the column from the base of the skull to the sacrum, on each side of the spinous processes, and between them and the angle of the ribs are deep excavations which are filled up with the powerful muscles that maintain the trunk of the body erect.

From the sides of the vertebræ there likewise arise short but strong projections of bone, termed transverse processes.

THE JOINTS.—The union of the ends of two bones to form a moveable joint or articulation has been already alluded to. The kinds of joints are various, and of course the kind and extent of motion also; for I do not take notice at present of what are called the immoveable articulations; as where the serrated edges of two bones are adjusted intimately to each other, or where the one is implanted into a cavity formed by the other but so tightly as not to allow of any motion. The first kind is exhibited in the mode of union of the several bones of the skull with each other; and the second, in the union of roots of the teeth with the jaw bones.

The two chief varieties of moveable articulation are the hinge, and the ball and socket. Of the hinge, we have examples in the union of the skull with the first vertebra, or bone of the spine, by

which the motion of nodding is performed; of the arm with the forearm at the elbow; of the leg with the thigh at the knee; by which flexion and extension of the forearm and leg respectively are allowed. Similar to these are the flexion and extension of the fingers. A modification of this cavity consisting in an angular and lateral hinge-like motion is seen in the union of the ends of the lower jaw with partial cavities in the upper, and in that of the wrist with the lower ends of the two bones which make up the forearm. The lower jaw when depressed and the mouth thereby opened undergoes a simple hinge-like motion; or by the action of other muscles it may be slid forwards; and by another set again drawn to one side and made to perform lateral movements. The motions of the hand as a whole, or, more specifically, of the wrist on the ends of the forearm, are both hinge-like, as in simple flexion and extension, and lateral, as when the hand is moved from side to side. A compound movement resulting from the two just described gives that of circumduction or imperfect rotation. Of the same kind, but not so extensive, are the motions of the ankle joint. The toes exhibit the simple hinge-like motion similar to that of the fingers.

Of the rotatory motions, we have that of the first bone of the spine on the second, of the spine on the sacrum or wedge between the haunch bones, and of the vertebræ on each other, especially at the

loins, and those of the shoulder and hip joints, and of one of the bones of the forearm (*radius*) upon the outer side of the lower end of the arm bone proper (*humerus*). It is customary to speak of the double movements of nodding, and of turning the face to the right or to the left, as if they were both of the head; whereas only the first is of the head with the first bone or vertebra of the spine; but the second motion is by the articulation of the first with the second bone of the spine.

The shoulder together with the hip joint come under the head of ball and socket joint. This mode of articulation at the shoulder admits of free and extensive motion in every direction; upwards, downwards, backwards, and forwards, and a motion compounded of these, viz: that of entire rotation or circular. The hip joint consists of the large head of the thigh bone inserted into a deep socket of the haunch bone. Deep as this socket is, it is still farther deepened by the cartilage which borders the brim. In the direction of the upper or outer part, the brim is particularly high, because it is in this direction that the reaction of the ground against the descending weight of the trunk tends to dislodge the ball from its socket. The joint of the hip, like that of the shoulder, is capable of motion in every direction; but its rotation is more circumscribed than that of the latter, on account of the greater depth of its socket.

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I have spoken, above, of the ends of two bones being joined together to form a joint or articulation. This requires to be explained, in order that the reader should understand better the mechanism of the joints. It must be borne in mind, therefore, that in no instance are the parts of the bony structure proper in actual contact. At each extremity of a bone which is to meet another at a joint, there is a covering of cartilage (gristle), which is endowed with great elasticity and prevents the attrition that would take place between the two ends of a bone, or between the ball and socket. Over this tip of cartilage is spread a very delicate and transparent membrane, which is reflected from the end of a long bone, we will suppose the head of the arm, and continues on to the border of the cavity or socket, and lines it. From this membrane and folds in it, or the portion external to and between the bones, is formed (secreted) a fluid of a somewhat oleaginous nature, which lubricates the two surfaces in contact and facilitates the motion of the joint. External to the cavity of this membrane, or what is called the cavity of the joint, there are numerous strong bands called ligaments which pass from one bone to another, and often in different directions so as to strengthen and prevent misplacements of the joints.

In some joints, particularly in the knees and at the lower jaw, there are loose cartilages or gristles

between the bones, and within the joint, so that the ends of the bones, instead of working upon one another, work upon the intermediate cartilages.

In brief summary, we might say, that columns of compact bone superimposed one upon another and united at different points by bands of prodigious strength form the pillars of support of the body. "But these bony columns never touch each other; are never in actual contact; are all separated by layers of elastic matter which, while they assist in binding the columns together, enable them to move one upon another as upon so many pliant springs. The layers of cartilage interposed between the several vertebræ; the layer of cartilage interposed between the vertebral column and the pelvis; the layer of cartilage that lines the acetabulum (socket of the hip joint) and covers the head of the femur (thigh bone); the layer of cartilage that covers the lower extremity of the femur and the upper extremity of the tibia and fibula (the two bones of the leg) and the tarsus (instep); the successive layers of cartilage interposed between the several bones of the tarsus; and finally the layer of cartilage that covers both the tarsal and digital extremities of the metatarsal bones (foot proper,) are so many special provisions to prevent the weight of the body from being transmitted to the ground with a shock; and, at the same time, so many barriers established between

the ground and the spinal cord (marrow), the brain and the soft and tender organs contained in the thoracic and abdominal cavities, to prevent these organs from being injured by the reaction of the ground upon the body. The excellence of this mechanism is seen in its results; in contemplating 'from what heights we can leap—to what heights we can spring—to what distances we can bound—how swiftly we can run—how firmly we can stand—how nimbly we can dance—and yet how perfectly we can balance ourselves upon the smallest surfaces of support!' ”*

THE MUSCLES AND MUSCULAR ACTION.—Incidentally, I have once or twice before spoken of the muscles as fleshy bodies or fleshy bands which pass from one bone to another and by their contraction and shortening move the bones at the joints. A very brief description will suffice to make this be readily understood; and again I would intreat the reader's attention to these preliminary explanations, a knowledge of which will singularly tend to a clear understanding of the value of the practical inferences to be drawn for physical education and the requirements of health and beauty.

The red fleshy part of meat is made up entirely of muscles. * But though redness be a character of

* *Philosophy of Health*, vol. 1. p. 325-6.

muscle in the warm blooded animals generally, it is not so in all animals. In some the blood of which is nearly white or bluish, the muscle is of the same color. The muscles which are subservient to voluntary motion, and under this head are all those which cover the skeleton and are interposed between the bones and the skin, are arranged in layers one over the other. Between these layers and between each muscle of the same plane is interposed some fat and more or less of that loose whitish tissue called cellular. Often, a muscle is invested with a strong though thin, tense, and shining membrane, the mechanical effect of which is to combine for one purpose, by directing in one line, the power of contraction of the various fibres of which each muscle consists. With the naked eye, and still more readily by the aid of a microscope, one can see, even in boiled muscular flesh, that between the fibres or threads of which a muscle is composed, there is an abundant supply of cellular tissue if not a direct investment of each fibre by transparent cellular membrane. One great advantage of this arrangement of interposed cellular tissue and fat, is the avoidance of undue pressure of one muscle upon another or of the several parts or fibres of a muscle on each other during their contraction.

In reference to general uses the muscles are divided into *flexors* or those which bend the body

and limbs, and into *extensors* or those which strengthen these parts.

In what does the so often spoken of muscular contraction consist? It is a shortening of the fibres and consequently of the muscle of which these fibres are composed, the obvious tendency and effect of which must be to bring the two ends of a muscle nearer together. The better to understand this, the reader should be apprised, that, generally speaking, a muscle is described anatomically as consisting of three parts, the middle or fleshy portion or body, belly as the anatomist calls it, and the opposite ends, termed the *origin* and *insertion* of the muscle. *Almost always, muscles are attached to one bone by their origin, and to another by their insertion.* If, as is commonly the case, the origin of a muscle be in a bone which is fixed, it is very obvious that the shortening of the muscle will necessarily draw its other end or point of insertion towards its point of origin. But as the point of insertion is also in bone, this latter will be brought towards the other or fixed bone. It is in this way that the limbs, and all the parts which have joints, are moved one upon another.

Rarely, however, are the two ends of a muscle thick and fleshy like its central part or body. Many inconveniences would result from thick masses passing over the joints, and especially, at the hands and feet, where various and prompt

movements are required. A uniform thickness of the limb or increased thickness at the joints would have existed and the waving outline and delicate contrasts of the forms be lost. Besides, there would be a useless expenditure of power. To obviate these difficulties, the muscle is made to communicate with the point of action by tendons, which may be compared to slender strings or wires as it were. The insertion of a muscle by tendon is more common than its origin by tendon. At the wrist and the instep we can see and feel these firm and yet somewhat elastic cords or tendons jut out, when the muscles above, with which they are continuous, contract. A familiar example of the termination of muscle in this way is furnished in the leg of a chicken; the soft or fleshy part proper being composed of muscles, which can be readily separated from each other, and the dense stringy parts passing downwards to the foot, and continued from these muscles, being the tendons.

Two highly important facts have just been stated; the first is, that a muscle, which, by its contractions, is to move one bone, is inserted in, and, it may be added, mainly if not entirely placed on, another bone, which is fixed; the second is, that the termination or insertion of a muscle is for the most part by tendon. The active power is at a distance from the resistance to be overcome, that is to say, the part to be moved. Of this principle

ready proofs are furnished to any person by the commonest trials. Thus, if the fingers be applied to the temples, where the hair begins, and the mouth be opened and shut with some degree of force, we feel a projection of the soft parts beneath the fingers and covering the side of the skull, which is nothing more than a contraction and approximation to one another of the fibres of the muscle which serves to close the mouth by bringing up the lower jaw, and, also, to aid in mastication. Now, although the body of this muscle arises in a fan shape from a segment of the side or temporal bone of the skull, yet it is implanted at a distance in another bone, that of the jaw, after passing down behind the arch of the cheek bone. If the arm be extended to its full length, with the elbow downwards, and the hand of the other side be made to grasp slightly the soft parts on the upper side of the arm proper, midway between the bend of the elbow and the shoulder; and then the forearm be suddenly bent on the arm, a manifest fulness and projection will be felt by the hand thus applied. This fulness and this projection are nothing more than the effects of a contraction of the great flexor muscle of the forearm; the origins of which are in part as high up as the shoulder blade, and in part in the arm bone articulated with it; and the insertion of which is by means of a strong tendon that can be felt by the hand of the

other side, if applied to it, passing from above the bend of the elbow and continued downwards some distance to the bone of the forearm. Let the hand of one side embrace in a strong grasp the forearm of the other about a third of its length from the elbow; and then if the hand of the side thus grasped be briskly opened and shut in quick succession, the fleshy part of the arm or the muscles will be felt jutting out, and in active contraction on both sides. One set of these muscles on one side, the inner, by their contraction pull in the tendons, some of which are felt at the wrists, and draw the fingers inwards and close the hand. Another set on the other side, the outer, pull on the tendons of the back part of the hand and draw it back and open it, and extend the fingers. When the foot is bent or flexed at the instep, by turning the toes upwards, we feel a contraction of the muscles in the middle of the anterior part of the leg, just external to the ridge of its great bone; the tendons which are continuations of these muscles pass downwards over the instep, and are inserted into the foot and toes. A reverse movement is that of extending the foot, as when walking or dancing, by resting on the balls of the toes, especially the great toe. At this time the muscles which make up the calf of the leg are felt to be firm and tense, and are in a state of strong contraction. They are the moving powers by which the heel is raised,

and the body for the moment supported. They all terminate in that strong common tendon, called by anatomists the *tendo Achillis*, and which is evident in every person, in its passage from the muscles of the calf of the leg to the heel in which it is inserted.

We make an important inference from these facts, in stating that it is not sufficient for the full motion of a joint or of the member below that it be exempt from any ligature or confinement whatever. The limb above the joint or that part on which the body of the muscle is situated must be equally free from all restraint. Thus, if a strip of shingle or of pasteboard be applied on the side of the arm between the bend of the elbow and the point of the shoulder, and tied on by circular folds of a bandage from the shoulder to the elbow, or even down to the beginning of the tendon of the great muscle already mentioned, so that this latter shall be firmly compressed and thus prevented from contracting, vain will be any attempt by volition to bend the forearm. The joint is just as stiff as if it were itself tied and bound by splints and bandages. So, likewise, the hand would be rendered powerless for grasping any object; the fingers could not be contracted on the hand, nor this latter made more hollow or concave; the whole member would be rigidly extended and stiff, if the muscles before described on the inside of the forearm.

were strongly and permanently compressed by a splint and bandages. The joints might be allowed their freedom and the tendons going to them be without ligature or band; they would all, still, be unable to move, so long as the motive power of the bodies of the muscles above was suspended.

On the other hand, if from any cause the joints be imperfectly used or in a great measure kept at rest, the muscles of the limb above will be small and flaccid, because they are not called into exercise; it being a law of the muscular system that muscles become full, firm, and large in proportion as they are exercised. Were the hand kept extended and the wrist stiff by splints on either side, and these secured by a circular bandage or roller, the muscles of the forearm, on which its fulness and roundness for some distance below the elbow depend, would after a while become flat, small and shrunk. They are deprived of the necessary condition for their health and growth; exercise, the means by which blood is drawn into them and expands and nourishes them.

Illustrative of the position, that freedom of the limbs from restraint of any kind and full exercise of the part into which the muscles by their tendons are inserted, are the requisites for, and means of, the fulness and volume of these muscles themselves, is the fact that persons exhibit great differences in these respects, according to the labor in which they

are habitually engaged. The massive muscles which make up the brawny arm of the blacksmith are the result of daily and active exercise of the hand, as the size of the whole upper extremity is of the motions of all its joints and the action of its muscles, including those of the forearm, arm, and shoulder. A notable difference will be observed, even, between the two arms; the right displaying more development and more strongly defined muscles, in consequence of its greater exercise. Bakers have, also, large and well proportioned arms from a similar cause—the regular exercise of these parts. To convince us of the immediate and necessary connection between the cause and effect in these cases, we often observe that blacksmiths, bakers, and others, whose arms and shoulders are thus full and rounded, have, many of them, legs and lower limbs generally disproportionately thin and small.

These persons will contrast strongly with porters and others, who walk much, and the muscles of whose legs and thighs are brought into regular and frequent contraction, and become in consequence large and strong. But, for this effect to be fully obtained, the feet must be untrammelled by tight or very clumsy shoes, which would interfere with the spring of the foot and prevent it from being fully raised from the ground, and the toes and forepart from being first applied in each step forwards.

“Look to the legs of a poor Irishman travelling to the harvest with bare feet: the thickness and roundness of the calf show that the foot and toes are free to permit the exercise of the muscles of the leg. Look again to the leg of our English peasant, whose foot and ankle are tightly laced in a shoe with a wooden sole, and you will perceive from the manner in which he lifts his legs, that the play of the ankle, foot, and toes are lost, as much as if he went on stilts, and therefore are his legs small and shapeless.”*

Continuing the illustrations in the language of another English writer of deserved celebrity;† “In a graceful human step, the heel is always raised before the foot is lifted from the ground, as if the foot were part of a wheel rolling forward; and the weight of the body supported by the muscles of the calf of the leg, as just described, rests for the time on the fore part of the foot and toes. There is then a bending of the foot in a certain degree. But when strong wooden shoes are used, or any shoe so stiff that it will not yield and allow this bending of the foot, the heel is not raised at all until the whole foot rises with it, so that the muscles of the calf are scarcely used, and in consequence soon dwindle in size and almost disap-

* *Animal Mechanics*—Treatise I. p. 28,9.

† ARNOTT.—*Elements of Physics*.

pear. Many of the English farm servants wear heavy stiff shoes; and in London it is a striking thing to see the drivers of country wagons with fine robust persons in the upper part, but with legs which are fleshless spindles, producing a gait most awkward and unmanly. The brothers of these men, and who are otherwise employed, are not so misshapen. What a pity that for the sake of a trifling saving, fair nature should be thus deformed. An example of an opposite kind is seen in Paris. There, as the streets have no side pavements, and the ladies have consequently to walk almost constantly on tiptoe, the great action of the muscles of the calf has given a conformation of the leg and foot, to match which the Parisian belles proudly challenge all the world."

It requires no sagacity, after this, to point out the impediments to the full exercise of the legs, and consequently to their suitable development, in the common use among us of stiff and tight boots worn by the men and of tight shoes by the women, so that in both instances the feet are cramped and prevented from those motions which are at once evidence of graceful carriage and of healthful strength. A contrasted state of parts from an opposite fashion and conduct is evinced, in addition to the examples already given, in the full development of the loins, thighs, and legs of a dancer; "and when we turn our attention to his

puny and disproportioned arms we acknowledge the cause—that in the one instance exercise has produced perfection, and that in the other the want of it has occasioned deformity.”

What holds good in the case of the muscles of the limbs applies with equal force to those on the trunk of the body. *The law for the healthy growth, size, and function of the muscles is imperative in every particular. It dictates the entire absence of external pressure, by means of band, ligature, or bandage of any description, and an observance of regular exercise of the muscles in due succession and alternation.*

For the hand to be able to move freely in various directions; for the forearm to be readily flexed, and extended, and rotated by motions at the elbow, it is, we have seen, an essential condition, that the forearm and the arm, the limb above the wrist as far as the hand is concerned, and the limb above the elbow as far as the forearm is concerned, must be divested of all pressure or compression. Not less essentially requisite is it, as a condition for the free movements in all directions of the entire upper limbs at the shoulder joint, that the chest, in front and behind, and the shoulder blades should be equally free from any pressure by the artifices of dress, whereby the muscles with which these parts are covered and from which they originate might be, in any manner, prevented from fully con-

tracting. If the muscles on the chest in front, and on the back and shoulder blade be thus prevented from contracting fully and strongly, they cannot draw towards them the arm proper into which they are inserted, in the manner already described. This limb consequently cannot perform those various movements required of it, and in which it is carried across the breast, or the hand is raised above the head, or carried to the back part of the head and neck, and even to the point of the opposite shoulder in the same line, or the fingers made to touch the spine between the shoulder blades, &c. It could not, with the muscles thus compressed, perform the rotary movement already adverted to. Pinioned to the chest it would be comparatively powerless for any purpose of utility or grace: the motions of the limb would be confined to the elbow, wrist, and hands; and the shoulder joint would become stiff and immoveable. All the graceful evolutions of the body in which the hands and arms are upraised, and joined, and describe so many curves would be lost.

But alas! this is not a suppositious case. It is one of too common, one might say it is becoming of universal occurrence amongst all females in town, and large numbers of those in the country who dress after the fashion, that is, who torture themselves into deformity and seek grace and beauty by a neglect of nature and of nature's laws.

The influence which the muscles of the chest exert on the motions of the arm, and the effect of these in giving fulness and roundness to the chest may be rendered still more evident by the following particulars. The cavity termed the arm-pit is made for the most part by the tendinous terminations of two great muscles of the chest, the one before and the other behind, which are inserted in the arm bone; as any person can ascertain by applying the fingers of the opposite side to these two terminations, the front and back of the arm-pit, during the active motions of the arm. The connection is in this way: from the side of the breast bone, from the second, third, fourth, fifth, and sixth ribs, and from a part of the collar bone, arises a great muscle called pectoral, which is spread over the chest (one on each side) and gives to this part the chief fulness which it displays in man. Its fibres converging terminate in a strong tendon, which is inserted into the arm bone, a few inches below the shoulder joint, and which forms, as above mentioned, the anterior border of the arm-pit. This pectoral is the chief muscle that carries the arm forwards and inwards towards the chest. Any undue pressure on the anterior part of the chest will of course interfere with, if it do not entirely prevent, the contraction of this muscle and the motion of the arm, inwards and forwards. As the female

breast rests directly on the pectoral muscle, it will also suffer in the manner already detailed, from pressure.

Antagonist to the pectoral is another broad and large muscle which covers the loins and the back of the chest, and which, when properly developed, gives a fulness to this region, below the shoulder blade and between the back bone and a line running directly downwards from the arm-pit. This muscle, which derives its name from its great breadth, after covering all the lower part of the back and loins, terminates in a thin but strong tendon which stretches to the arm and is implanted into the bone, where it forms the outer border of the arm-pit, as the tendon of the pectoral or muscle of the chest in front was shown to form the inner border. The office of this broad muscle of the back is to draw the arm downwards and backwards; whilst that of the pectoral is to carry the limb forwards and inwards, and somewhat upwards. The conjoined action of these muscles, by which both tendons or borders of the arm-pit are made to pull on the bone at the same time, is to draw the arm either directly downwards or to keep it closely applied to the side of the chest.

It must be very obvious that pressure on this muscle, that is on the chest and loins which it covers, will prevent its requisite and healthy con-

traction, and of course interfere with its direct office or with the aid which it gives to the muscle in front.

The muscle, by which the arm is raised directly upwards, so that the elbow is on a level with the shoulder, begins, in part, at the collar bone and, in part, at the projecting portion of the shoulder blade which is felt just above the joint. Passing downwards from a broad basis, its fibres converge towards a tendinous slip which is inserted about midway down the arm. This muscle contributes much to the roundness and pleasing contour of the shoulder. Its name is, technically, *deltoid*; it might be called the shoulder muscle.

. There is yet another muscle which merits notice in this place. It has a tendinous origin on the projecting points of the back bone or spinal ridge, from the head down to the loins. Its thin fleshy fibres pass, some downwards, others directly outward, and some upwards to be inserted into the ridge of the shoulder blade, the tip of the projecting part, and into the collar bone. The first or upper portion of this muscle, in its course from the back part of the head to the point of the shoulder, forms a curve which is observable even under the skin and fat, and which serves with its fellow of the opposite side to give that fine undulating yet well defined outline of the back part of the neck, and rise at the region of the shoulders. The border

of this muscle or rather the prominence made by its border is seen distinctly in front on each side of the neck terminating at the shoulder.

It is evident, from the preceding description, that the fulness and roundness, in a great measure, of the chest in front, and below the collar bone, and of the chest behind and below the shoulder blade, and of the neck behind and the continuous region of the shoulders, and of the shoulder at the joint and beginning of the arm, depend on muscles which, respectively, cover these regions, and the action of which is displayed in moving the arm, and in the instance of the thin and extended muscle from the head and spine to the shoulder blade, in moving this latter.

It unfortunately happens that the very regions specified, and notably the chest in front and behind, are those which females subject to early and continued daily pressure, by corseting and padding, in obedience to the absurdities of fashion. The muscles lose, in consequence, their powers of contraction; the arms cannot be moved with ease and freedom, and the undulating lines, by the gradual and alternate swell of these muscles, and the fine contour of the bust are all lost.

The shoulder blade is covered, as with a soft cushion, by large and fleshy muscles both above and below its ridge or spine and on its under surface; all directly adherent to it and inserted into

the arm a little below the shoulder joint. As these are not so readily recognisable, either by sight or touch, I shall not speak of them separately as I have done of the more superficial muscles, or those directly under the skin and adipose and cellular tissues. It is sufficient for the present argument to say that these muscles, thus covering and adherent to the shoulder blade and whose bodies on its external side take off from the angularity of this bone by diminishing and in some cases concealing the prominence of its spine or ridge, are necessary agents, in conjunction with those before mentioned, for moving the arm in different directions. The one which fills the space above the spine of the shoulder blade, or *scapula*, aids the triangular (shoulder) muscle in raising the arm. Another which fills up the cavity below the spine, and its neighbor at the lower margin of the shoulder blade, turn the arm outwards and assist in raising it. Another again below this last turns the arm inwards and draws it backwards; whilst that great muscle, which covers all the inner side of the shoulder blade, and from the smooth membrane by which it is itself covered enables this bone to ride easily in the upper and back part of the chest, turns the arm inwards, or when raised depresses it.

One immediate lesson to be derived from that which some may consider tedious and needless minuteness, is this: If from want of exercise or

from ligatures or bandages on the chest, and over and tying down the shoulder blade, all the movements of the arm, before described, cannot be, at any time, regularly performed, we may be sure that an injury has been done to some one or more of the muscles; analogous to fracture of a bone or sprain of a joint; and that whoever has the superintendence of the education of young persons, whether infants or adolescents, thus cramped and impeded in their movements, is answerable, before a high and solemn tribunal, for the present weakness and future deformity which have been allowed to take place by neglect, if not positively induced by the inculcation of mischievous practices.

And again. The various trials made to perform the complex movements at the shoulder joint will show very speedily, that these latter are incompatible with any fashion of garment which imposes the least impediment by ligature or pressure, in any way, on the muscles. It will be soon discovered, also, that exercise of the arms in the different motions of which they are susceptible, by rendering the muscles still more obedient to the will, enable the individual to give a graceful air and appropriate expression to whatever attitude and movement these limbs contribute their share.

But the permanent expression, depending on ample development of the region of the shoulders and chest, and the undulating swell of the muscles

with their covering of cellular and fatty tissues and skin, will be also greatly improved by this freedom of motion in every direction of the limbs; for the remark made of one applies to all. In proportion as an organ is exercised, it not only acquires strength but also bulk. This is especially true as applied to the muscles. During their action the blood is brought to them in increased quantity and subsequently retained in greater proportion in their tissue. In other words; they are enlarged and acquire additional firmness and distinctness of outline. No new evidence of this fact need be adduced, after what has been already said respecting development of particular limbs, upper or lower, and other parts of the body, under special or partial exercise, limited mainly to them. But this exercise to be useful and to preserve harmony in the proportion not only of the different limbs with each other, but of the different sides of a limb, must be such as to call into action, in succession and alternation, all the different sets of muscles. If some are permanently quiescent whilst others are exercised there will necessarily result disproportion and deformity.

It has been stated in a former page that the muscles are divided into *flexors* and *extensors*. For our present purpose this division is sufficient. Were more precision of detail required it might be added, that there are still other muscles, the office

of which is to turn the limb, especially the upper one, in directions required by the part which the hand has to perform. Thus the forearm, whether half flexed or extended and kept at any given distance from the body, can be made to undergo a motion of rotation, and the hand, by the action of certain muscles chiefly situated on the two edges of the forearm, be made to turn so that the palm shall be either directed to the ground or upwards to the heavens. The first of these movements is called pronation; the other supination.

The counteracting power of the two sets of muscles; the flexors by which the trunk and the limbs are bent, the extensors by which all these parts are straightened; is termed their *antagonism*. By this antagonism the limbs, when at rest and the body reclining, are kept in a mid-position between flexion and extension; although with rather an inclination to the former, as if the flexor muscles were the stronger of the two. When one set contract, as the flexors of the forearm, for example, so that the elbow is bent, the resistance overcome was not only of the bones to be moved, but also of the extensor muscles on the outside of the arm.

Paley's illustration of the antagonist action of the two sets of muscles is familiar but clear. "Every muscle is provided with an adversary. They act like two sawyers in a pit, by an opposite pull; the nature of the muscular fibre being what

it is, the purposes of the animal could be answered by no other. And not only the capacity for motion, but the aspect and symmetry of the body are preserved by the muscles being thus marshalled according to this order; e. g. the mouth is holden in the middle of the face and its angles kept in a state of exact correspondency, by several muscles drawing against and balancing each other. In a hemiplegia, when the muscles on one side of the face are weakened, the muscles on the other side draw the mouth awry." So in like manner, in this palsy of one side or half of the body (hemiplegia), the muscles of this side being weakened and powerless, those on the other draw the parts in that direction, and the perpendicularity of the body and its symmetry are lost.

Similar deformity is produced by the long continued and disproportionate action of one set of muscles, or of those of one side. The advanced shoulder and halting step of the ploughman are to be attributed to one foot being always in the furrow; and to the inequality of soil on which he is accustomed to walk, calling for an unequal activity of the muscles, which are thus in consequence disproportionately developed. In sailors, from the long habit of stooping on board the vessels owing to the lowness of the decks, the flexor muscles have acquired so much greater strength than their

antagonist extensors that these persons are unable to walk erect when on shore. Artisans generally contract some bend or twist in their backbone or limbs, from this continued activity of one set and torpor of another set of muscles, so characteristic as to enable a practised eye easily to judge of their respective pursuits, without any other information than what is derived from their appearance. Young persons of both sexes, says Bamfield, are liable to lateral curvature of the spine, from adopting a habit of sitting before their paintings and drawings, with an inclination of the body to the left side, the left arm resting on the elbow or hanging by the side, sometimes with the palette in the left hand, whilst the right arm and shoulder are raised, for the purpose of directing the pencil, and the head is directed to the left shoulder. In this position the spine is kept in a lateral curvature for a length of time, and the practice being continued daily, there is at last a permanent curvature or distortion in this direction. To the same point is the following peculiarity. "Among the male aborigines of London, the practice of *giving* the wall by the left, and *taking* it by the right shoulder, which originated in their narrow crowded streets, something less than a hundred years ago, has given an advance to the right shoulder, and an obliquity to the trunk, by which they are easily

distinguished amongst other men, and which vain new-comers often awkwardly imitate from an idea of these positions being fashionable.”*

But we shall be able to appreciate better these and other deviations from the symmetry and proportions of the human frame, after a brief description of the more common postures and of the effect of different familiar attitudes.

STANDING POSITION.—The tendency of the body, so far as gravity merely would act, is to fall forwards; and it is only by a continued, and, generally speaking, conscious effort that the erect position can be maintained. The weight of the head is not equally divided; that is, its axis is not the line of its union with the first bone of the spine. A greater portion of it being anterior to this line, the head naturally inclines to fall forwards. The weight of the organs in the chest, the lungs, and the heart, indirectly connected with the spine, tend to drag it forwards, and to produce a stoop. A similar effect is produced by the weight and dragging downwards and forwards of the liver, stomach, and the other organs in the abdomen. By what means or mechanism then does the head pre-

* DUFFIN, On the Influence of Modern Physical Education of Females in Producing and Confirming Deformity of the Spine.

serve its balance on the spine, and the spine ride straight like an elastic spring on the haunch bones, or *pelvis*? It is obviously by agents under the control of the will, and which require for their active display a certain degree of growth and strength of the body. That the effort is a voluntary one, is evident from the fact, that a person with head and spine erect, when either seated or standing, loses directly this perpendicular position so soon as he loses his consciousness, and with that his volition, by sleep. He first nods, the head falling forwards, and if this motion does not rouse him, the other weights acting in the direction of their gravity unchecked by any opposing influences, he falls down, if he had been standing, or off his chair, if he had been seated.

That a certain degree of growth and strength for volition to act on is requisite, we have proof in the inability of the infant to raise its head, and, for some time after it can do this, to keep its spine erect on the pelvis, so as to be able to stand. In the other extreme of life, viz: in advanced age, the head and body generally incline forwards, obedient to the common law of gravity. At any period, if the body be weakened by disease, or the influence of volition suddenly removed, as in apoplexy, or epilepsy, fainting, &c., this forward direction and fall take place.

The mechanism by which the forward and bend-

ing motions are prevented is of two kinds; passive and active. The passive consists of strong ligaments which pass from the lower and back part of the skull to the spine, and from one to another of the posterior prominences of the latter. But that these alone are not sufficient is proved by the instances just given. The other kind of mechanism is in numerous strong muscles, which pass from the back part of the skull to the bones or vertebræ of the spine, and from the upper to the lower of these, and from the latter again to the haunch bones. These muscles are called the extensor muscles of the head and back; and they serve, when made to contract and kept in contraction by the emanation of the will carried to them by the nerves from the brain, to resist the tendency of the head to fall forwards and of the spine to be curved, and of the contents of the chest and abdomen to drag the body forwards and downwards. This tendency is greater, also, owing the weight of the upper extremities, which, though pendent at the sides, we will suppose, are articulated before the direct line of gravity of the haunch bones or pelvis.

By grasping the back part of the neck between the fingers, when the head is erect or thrown a little back, we feel the rigid bands of muscles by which this posture is preserved. These are eight

in number on each side the median line or that drawn over the projecting processes of the spine, to which by one end they are closely adherent.

There are other muscles which connect the shoulder blade with the back part of the head, and which in common draw the former upwards and backwards; or, on occasions, if the shoulder bone be fixed, they will draw towards it the head, and thus contribute to the preservation of the erect position of this latter.

The order in which the muscles at the back part of the neck are arranged is this. Beginning with that which first presents itself after the removal of the skin and cellular and fatty tissues, we meet with the triangular muscle before described, and which, we may as well add, in consequence of its insertion in one direction in the collar bone and tip of the shoulder blade draws these parts backward, and contributes to that movement termed a shrug of the shoulders. Beneath this muscle, again, are those which connect the back part of the head or the skull with the shoulder blade. Under these and resting on the spine and its projections, and connected with the posterior region of the head are the proper extensors of the head and neck. To this distribution of muscles, one under the other, the term *layer* is given.

Some of these extensors have the power, when

the muscle of one side only is active, to draw the head to one side, as well as backwards, and in this respect they are muscles of expression.

Below these, and filling up the space between the angles of the ribs and the projecting or spinous processes of the vertebral column or spine are strong fleshy muscles with long tendinous ends, by which the back is kept erect. Beauty and use both are ministered to by this distribution of the muscles; since the sharp prominences of the spine and of the angles of the ribs and the deep depression between them would be both unseemly and render lying down or resting the back on any surface uncomfortable and painful. Very thin and feeble persons, the muscles of whose back have become emaciated from want of exercise, suffer in this way. But not only is the space between the ribs and spine thus occupied by muscles, but, also, the region of the loins, those fleshy parts between the lower ribs and the haunch bones on each side of the spine, is similarly filled up.

There are other smaller muscles along the spine, some of which have the power, when they contract, of giving lateral motion to the neck and loins, and others a semi-rotation.

Even this imperfect sketch of the number and variety of the muscles ranged on each side along the spine, will prepare the most unlearned reader for appreciating the great extent of muscular

action, and the necessary exhaustion of muscular power from long standing, in which position they are, all of them, in a state of strong tension. It will be understood, of course, when speaking of a muscle and its connections, that it has its like and duplicate on the other side, in a similar location. No set of muscles can be kept for any length of time in contraction without a feeling of weariness; and if the contraction be prolonged beyond measure, feebleness and inability to move are the consequences. Alternate contraction and relaxation are the conditions for the healthy and easy state of the muscles; and it has been found that an individual will encounter less fatigue by a protracted exercise of the body in walking, in which both flexors and extensors are brought into alternate action, than by standing, in which only one set of muscles, the extensors, are required. The right arm will be less fatigued by varied active movements, as in fencing for example, or in some laborious handicraft employment, for an hour, than by an effort to keep it extended at a right angle from the body for a fourth of that period. In the former cases there is alternate contraction and relaxation of the different sets of muscles by which the arm is moved; in the latter case, there is a strain, by continued contraction, on one set of muscles alone, the extensors.

In standing there is a strain on the muscles

which keep the head erect on the spine, and of those which keep the spine erect on the haunches. So far the chief weight of the body is felt at the loins, the lower vertebra of which bears all those above it and the head on them as well as the heavy organs in the chest and abdomen indirectly connected with the spine. At this region are the strongest and largest muscles of the back, passing from the spine downwards on each side and attached by their other extremities to the haunch bones. These muscles serve a somewhat similar purpose, in keeping the spine erect, to that which the standing rigging of a vessel does in preventing the mast from swaying to one or other side, as it would constantly be doing if not steadied by this means.

But another large class of extensor muscles are active in standing. Those which keep the haunches fairly on the thigh bones make up, together with the fat that covers them, the fleshy prominences at the hips. They cover the outer part of the haunch bones, from which they arise, and are inserted by tendons into the thigh bone in the vicinity of the hip joint. The thigh, again, is kept from bending at the knee and preserves its straight direction in the line of gravity by means of the strong muscles on its anterior and outer part, which are inserted into the knee pan, and through it act on the great bone of the leg. This latter is kept straight by the great muscles, whose

fleshy bodies constitute the calf of the leg, and which terminate below in the great tendon of the heel.

Weariness from long standing is partially relieved by throwing the weight of the body on one side, so that it rests mainly on the hip and the corresponding thigh and leg; whilst the muscles of the other side are allowed, in a measure, to relax. After a little, the direction of the effort is changed and the side, the muscles of which were in a state of tension, is relieved.

It can be understood now why walking is less fatiguing than standing, during the same period of time. In the latter, one set of muscles are in a state of continued contraction. In the other, they are relieved by being allowed to relax whilst the other set are in contraction.

In standing, the basis of support is that space covered by and between the feet, the whole weight of the body being borne by the latter. If, however, we can enlarge the basis or multiply the lines of weight, as by leaning against or on any object, the weight itself of the body is diffused over more surface, and in proportion as the points of support are multiplied will the feeling of fatigue be less.

SITTING POSTURE.—Before speaking of the mechanism of this posture, it will be proper to refer

briefly to the muscles by which the head is bent on the chest and the trunk on the lower limbs. These are the flexor muscles, antagonist to the extensors, which have been noticed in the preceding section.

The head is bent forwards by muscles which pass from it to the vertebræ below; with which they are closely connected, behind the throat, wind-pipe, and gullet. There is another larger and more superficial muscle, one on each side, an arrangement which by the way is to be understood as universally the case in all the accounts of the muscles, which is readily felt, and in thin persons easily seen arising from the prominence of the skull behind the ear, and passing obliquely downwards and forwards to be inserted in the upper part of the breast bone. When both muscles contract the head is brought down towards the breast. If only one contracts the head is drawn obliquely downwards and to one side.

The lateral or side flexion of the head and neck is accomplished by the contraction of two muscles which pass from the lateral projections or *transverse processes* of the upper vertebræ to the borders of the first and second rib. Sometimes when the neck is fixed these muscles pull upwards the ribs, and then they are muscles of respiration.

We have seen in what volume and number are the muscles all along the back part of the spine, from the head to the haunches. Anteriorly

there is not a corresponding arrangement in this respect. Instead of the bony prominences jutting out from each vertebra, as we see, and feel also, on the outside by running the fingers along the spine, the inner or anterior side presents rounded and convex bodies with the elastic matter or intervertebral cartilage between them, the whole being covered by a smooth shining ligamentous band. The only muscles on this anterior region are the few small ones high up on the bones of the neck, and a few, larger and powerful ones indeed, between the lower bones of the back and the thigh bone. But in every instance, these muscles, as far as they are connected with the spine, are adherent to the lateral or transverse prominences. It may easily be understood, indeed, that any mass of substance, like muscle, resting directly on the anterior face of the spine, and subject during its contractions to sudden changes of size would greatly interfere with the ease and functional exercise of the important organs immediately before it, such as the lungs, liver, stomach, pancreas, &c., &c.

We know, however, that not only are the head and neck bent on the chest, but that this latter is bent on the pelvis or haunch bones, and the back at the same time flexed. These movements are performed by strong and large muscles which pass from the lower part of the breast bone and the

borders and surfaces of the lower ribs to the anterior border of the haunch bones. These muscles called abdominal constitute, moreover, the fleshy walls behind which are all the important organs of digestion. They, when they contract, draw the chest downwards and forwards, and by their action on the ribs and breast bone necessarily draw the spine, to which the former are attached, forwards, and thus produce that forward inclination known by the term stoop or bending, either directly forwards or to one side, according as the muscles on both sides or on one side contract. If, on the other hand, the chest be the fixed point, they will raise the pelvis or haunches. By their connection with the ribs, the chest and back being kept erect, they pull these bones downwards during expiration or the expulsion of air from the lungs. They also perform an important part in other processes, the details of which are not necessary for an elucidation of our present subject.

The reader will now better understand the sitting posture and the attitudes of the body when seated, through the alternate or antagonist action of the flexor and extensor muscles. The lower extremities, provided the feet rest on the ground, are no longer tasked to the support of the trunk. This last is done by the more extended surface of the prominences of the haunch bones and under surface of the thighs. But if the head is required

to be kept erect on the spine and this latter on the pelvis, there is the same strain and fatigue of the muscles of the back as in standing. The two modes of relief to which a person thus situated has recourse are, 1. either to lean against something which will extend the basis of support, as the back of a chair or the wall, &c.; or, 2. to lean forward and by a contraction of the flexor to partially rest the extensor muscles, those along the back of the spine, and which had been in a state of continued tension. The most natural and easy posture is midway between these two; that in which the shoulders are supported behind, and there is a slight bending of the back at the loins, so that the chest falls and is inclined a little forwards.

WANT OF SYMMETRY AND DEFORMITY FROM CERTAIN POSTURES.

Nearly all the deformities of habitual stoop, of inequality in the shoulders, of curved spine, and of flattened chest are the consequences of certain postures unduly prolonged and of a deficient exercise of the muscles of the body. To the reader who has attended to the description of the bones and muscles and of their connection and relative uses, in the preceding pages of this chapter, the proposition will be very apparent.

A due equipoise of the head on the spine and that of the spine on the pelvis on which it rests, depend, as far as the bones and joints are concerned, on their proportionate adjustment to each other, and on there being a perfect equality between the two halves, right and left, of the bones of the spine and of the elastic and intervertebral cartilages which occupy the spaces between them. If a single vertebra or bony ring be thinner, or less firm on one side than another, the whole of the column above will lean in the direction of this deficient part. There will be a slight hollow there and a projection at the opposite side, in virtue of the structure of the spine. Were this column a solid one, the fissure on one side would merely make an angle on the other; but being composed of many bones and intervening elastic matter, a break in one spot causes a gradual yielding and the formation of a curve.

A natural and the most gradual curve is that produced in the customary movements of leaning forwards, or to either side. At the moment when the flexor muscles draw the body forwards there is a greater strain on the anterior portion of the vertebræ and a tendency in them to be approximated. The effect of this is a compression and yielding of the intervertebral or elastic cartilage in front and its distension behind, owing to the diminished pressure from the now separated outer halves of the

vertebræ. So soon as the voluntary effort, by which the muscles were contracted and the body bent, ceases, the bones of the spine are no longer pulled, and the intervening cartilages, like all elastics, promptly resume their former direction: they expand, and while the vertebræ are separated to their former distance in front they resume their customary approximation behind. In fine, the balance is restored, and the body becomes straight by the now moderate action of the extensor muscles. It is possible, indeed, though only occurring in cases of some violent convulsive disease and from long and continued trials, as in tumblers, for the extensors to act so powerfully as to produce a backward curve, and thus to cause pressure on and diminution of the cartilage in this line. There are anatomical peculiarities in the articulations of the bones of the spine, which prevent this backward inflection from being carried to the same extent as the forward one.

Next to the evenness and healthy state of the bones and intervertebral cartilages for preserving the due equipoise, it is a necessary condition that the muscles act with regularity and proportionate vigor. I say proportionate, in reference to the flexors and extensors; but it must be equal as respects the muscles of the two sides which belong to either series. If, for instance, the muscles, whose office it is to keep the head and back erect,

be weaker on one side than another there will be a lateral inclination of the body towards the weak side and an incurvation of the spine in that direction.

The condition, therefore, for entire symmetry between the two sides of the body, the line between which is along the ridge of the back bone, is equal strength of the muscles of each side, including both those directly connected with the spine, and indirectly through their attachments to the limbs. But the exercises and postures and most of the occupations of mankind are such as to call into action the muscles of one side more than the other. Before speaking of these, which are causes of lateral curvature of the spine, I shall first advert to the common variety of incurvation forward in consequence of long continued stooping.

The habit of bending the head and neck over a table or low desk whilst writing or drawing becomes, in many young persons, whose bones are yet tender and cartilages less elastic than in after life, a cause of permanent deformity or direct curvature of the upper part of the spine. Various occupations in doors, and even in the fields and garden, in which the body is habitually bent forwards, also produce this deformity. Often, where the muscles of both sides of the body are fully exercised the stoop is a habit which, with suitable training and by calling the extensor muscles on the

back into play, may be readily removed. Thus, for instance, the youthful rustic, who had acquired this stoop, when put under the drill sergeant soon learns to hold himself and to walk erect.

Different is the case, however, with persons of a delicate frame, females, for example, who spend most of their time seated and stooping over their needle-work. In them the muscles which flex the body are habitually exercised and the extensors or those which would keep the back straight are habitually inert. The bones of the spine are brought, at least during the day, into constant approximation and their intervening cartilage is compressed in front; there is a permanent change in a portion of the vertebral column, with a falling in of the chest and elevation of the shoulders. But as the pressure of the head on the vertebræ and of these on each other are seldom, under these circumstances, equal on both sides, laterally, there will often be added to the stoop, a curvature of the spine on one or other side, or a lateral curvature as it is termed. Of this I am now to speak, as the most common, because its causes are in most frequent operation.

LATERAL CURVATURE OF THE SPINE.—There are few mothers or teachers who have not seen the “jutting shoulder.” Few of these unhappily are aware of the true cause, and still fewer have re-

course to the proper means of prevention, of this want of symmetry. The right shoulder projects more than is natural and is in common parlance said to be "growing out." The depression in the line of the back bone between the shoulder blades is no longer at equal distances from the latter; a greater space being observable between the original perpendicular spinal line and the top of the elevated shoulder bone than between the same point and the corresponding top of that of the left side. But there is an approximation of the spine itself by its curve in that direction, to the right shoulder. For the case, we will suppose, is one of right lateral curvature. These appearances, together with a remarkable prominence of the lower third of the shoulder blade of the distorted side, alarm the parents, who are the more surprised at the extent to which the deformity has proceeded from its not having previously attracted much notice.

The gait of the young person appears awkward and shuffling; her clothes cannot be made to fit well upon her—they appear to be drawn to the right side. The sash encircling her waist is observed to dip towards the same side, while the right breast presents a remarkable fulness and the corresponding collar bone displays a proportionate elevation. When the deformity is not noticed till about the fourteenth or fifteenth year, the state of

the breasts most frequently first attracts attention, one appearing larger than the other, and growing so unequally as to lead to a suspicion that it is diseased.

In proportion as a curved projection takes place in the upper part of the back between the shoulders, nature in order to counterbalance the evil, and preserve the equilibrium of the body calls into action the muscles of the lower part of the spine, which operate with proportionate power on the opposite side, so that in confirmed cases there is in fact a double curvature produced.

As the distortion advances, a similar counterbalancing power is exerted by the muscles attached to the spine in the neck, and a third or upper curve, is then formed, so that the spine presents, in fact, a serpentine appearance, inclining to each side alternately. The ribs in consequence of the alteration in the direction of the spine, with which, as has been shown, they are connected, deviate from their true course and partake of the change. Finally, the basis, or the haunch bones (*pelvis*) on which the spine rests, becomes involved. The lower part of the vertebral column is thrown to the left side; and this displacement being favored by the disposition to rest on the left foot, whilst the young person is standing to speak or read, there follows a permanent projection of the left hip; and

the whole body when viewed from behind seems to be twisted on itself.*

What are the CAUSES of curved spine and its associated deformities? On a knowledge of the former, will depend the success of the means of prevention of the latter. The causes belong to two classes. Under the first, we include whatever interferes with the growth and firmness of the bones and the requisite fulness and size of the muscles. Under the second, whatever produces an inequality in the action of the antagonist muscles, the flexors, and the extensors, or of the two sets of the same kind, on opposite sides of the body.

The causes of the defective growth of the bones and muscles, are a want of pure blood circulating in the body, out of which the materials for the formation and use of both bones and muscles are obtained. The requisite supply of blood is not made if indigestible food or that which does not furnish nutritive matter enough to be converted into the fluid of chyle is taken. Blood will be impure if the process of respiration, by which the blood undergoes the necessary changes in the lungs is not carried on. In these cases, the bones are soft and readily yield to any slight inequality, that is temporary increase of pressure; and the

* DUFFIN.—*Op. citat.*

muscles are flaccid and fail to contract with the requisite energy.

These causes give a disposition or proneness in the body, particularly the spine and contiguous parts, to be affected by the second series, viz: an inequality in the action of the muscles and consequent unequal pressure or compression on some parts of the bones of the spine more than on others.

Now it unfortunately happens that the persons who suffer most from the operation of the first series of causes or of those which prevent the healthy growth, firmness, and fulness of the parts implicated, are they on whom the second series operate with most frequency and for the longest time. But first let me enumerate the chief of these latter.

It may be laid down as a general proposition, one of the highest importance, and using the very words of Donald Walker—"that THE ONE SIDEDNESS WITH WHICH ALMOST ALL THE ACTS OF LIFE ARE PERFORMED IS THE GENERAL CAUSE OF THE GREATEST AND MOST UNIVERSAL DEFORMITY; AND THAT ITS PREVENTION REQUIRES AN EQUAL AND SIMILAR USE OF THE OTHER SIDE." I have already explained how parts much exercised acquire volume and have shown by various examples how the muscles in frequent action acquire a predominance over those which are less or but little used. The application of this principle is seen in the deviation and deformity primarily and chiefly towards

the right shoulder; for it is the right side and especially the right arm which is preferably employed in nearly all the acts of life, whether of the merely mechanical or those in which the intellect is more especially employed. At school the predominance of the right arm by the exercise of its muscles is out of all proportion, or rather is in no proportion at all to the use of those of the left arm. Thus in writing, drawing, guitar-playing, harp-playing, and even in piano-forte playing, it is the right arm which is either exclusively or chiefly occupied. And hence the deviations from the straight line of the spine to that side so greatly exceed those in an opposite direction; being, as Mr. Shaw informs us, to the latter, in the proportion of eight to one. The muscles of the right arm act first on the shoulder blade and the ribs which are connected with the spine; and these in turn pull the spine itself towards the right side and thus cause the first curvature in that direction.

Deformity will be produced in a delicate young person, even by what would be little suspected—lying always in the same posture in bed. When the pillow is very high and the bed soft, as in the case of its being of feathers or down, the posture into which the body falls is thus described: “the loins sink into the bed, the upper shoulder is pushed out of its natural place, the back is twisted and

the neck is turned awry. A girl who is accustomed to lie in this false position for years together, as is sometimes the case, can scarcely fail to have her figure injured, particularly if she be weakly. Instead of a soft bed, a hair mattress should be used, with a rather low elastic pillow."

Doctor Darwin says, that young ladies should be directed, where two sleep in a bed, to change on alternate nights, or weeks, their sides of the bed, and thereby prevent their sleeping always on the same side.

A young person when seated erect, and deprived of any support to the back for a length of time, endeavors to alleviate the discomfort and sense of weariness by means of alternate efforts at *balancing*. Seated upon a stool or chair, a person may throw the weight of the head, trunk, and extremities upon either of the hips, almost without any apparent deviation of the spine from the perpendicular. This is effected by drawing the spine to one side, and leaning the head and neck slightly to the other. Girls often rest themselves in this manner, when writing or when playing upon the piano and upon the harp, though they are thought to be sitting sufficiently upright. The right hand being in all these occupations that which requires most scope for motion, gives rise to the right shoulder being raised, and in order to facilitate this, to

the balance of the body being maintained on the *left* hip. The curvature which arises from these habits, is thus directed to the *right* side.

In standing, a weakly child with the slightest inclination to lateral curvature will increase it by resting, as it habitually does, on one foot more than the other. The spine and its superincumbent and connecting weight are thrown on this side and the intervertebral cartilages losing their elasticity by the undue pressure become less thick and allow of a concavity being formed on the same side.

We infer, then, from these statements of the effect of various postures, that any deviation of the body from the perpendicular line, whether by stooping or leaning to one side, will, if long continued, end in that deformity called curvature of the spine. This bony column with its intervertebral cartilage and ligaments is, we have shown, kept in its erect position by numerous and strong muscles, which constitute the mass of flesh on each side in the cavity between it and the angles of the ribs and in the region of the loins. Obviously, therefore, on the health and equal strength of the muscles thus arranged on each side of the spine depends its preservation of the perpendicular line, or of that straightness and symmetry which consist in an equal development and proportion of the two sides of the body. By voluntary effort a

person may for a while, without inconvenience, task the muscles of one side more than those of another as in the different postures above described. But there is generally a risk unless these be alternate from one to another. Permanent exercise of one side gives, we have seen, an undue predominance to it. The corrective must be found in equal exercise of the other side.

There are two states induced by different causes in which the inequality of support is seen. In the first, by continued and excessive exercise the muscles become weary and fail to preserve the equilibrium; in the second, by deficient exercise or where it has not been used at all, they are unable to act with any power and fail to keep, either the head on the spine or the spine on the pelvis. An instance of the one is seen in a person who has been standing for a long time, or even seated on a stool or a chair without a back. The extensor muscles of the back on both sides are exhausted; and relief is sought by bending the body forwards and resting the chest and head immediately on a table or desk, or mediately by the arms being made props; the hands applied to the head and the elbows resting on the supporting substance. An example of the other state or that of prolonged inaction of the spinal and dorsal muscles is witnessed in those who have preserved for a length of time an entirely recumbent posture. When these

persons are required to sit erect, they cannot accomplish their purpose in this respect at all, or if they succeed they must soon have recourse to a prop of some kind to lean against.

The great difficulty of keeping the body erect, after either excessive exercise or unmeasured inaction, gives of course a ready tendency to its leaning to one or other side; since there is nothing to resist the influence of the slightest cause which should make the body deviate from its straight line. The more prolonged the weakness of the muscles the greater the probability of this deviation persisting and of its becoming fixed. How little chance must there be, then, of escape from a fixed deformity of the spine, if the muscles are permanently weak and one cause of unequal action of the two sides of the body is constantly present. In this situation are all children and young persons who are compelled, when at school, to spend hours with head and bodies erect, either standing or seated, and whose right arm is that which is chiefly if not solely in action.

It has been proved to the reader's entire satisfaction, I may hope, that the strength and the size of muscles are increased in proportion as they are exercised; and that the more evident these properties of size and strength the greater the ability of the individual to resist fatigue. The converse is equally clear and requires no enforcement. It is

that which is seen in the cases of those children and young persons who are confined for so many hours in a close and ill-ventilated school room, and prevented from taking that kind and variety of exercise called for by their growth and health. Without prior or concomitant training the muscles of the back are tasked to exertions which would tire those of a man accustomed to and strengthened by active sports and labor. They soon of course are wearied and fail to support the body equally well on both sides. A leaning to one or other is followed by curvature of the spine and its associated symptoms.

But if muscles, weak from defective exercise, are unable to discharge their functions, what hope can we have of better results from these same muscles when they are not only entirely quiescent and torpid, but in a measure withered and diminished in size. Those of children of both sexes much immured in the nursery or the school room or the factory are in the first state. Those of young females daily subjected to the cruelty of corsets and consequent pressure are in the second.

By the continued and prolonged use of corsets the muscles of the back, and of the chest also, are subjected to the same debilitating and almost paralysing pressure which follows the protracted application of long splints and circular bandage to a limb. In addition to the illustrations of this

point already given, may be mentioned the practice of some beggars, who, in order to excite the sympathy of the passers by, present to their notice a leg or an arm apparently shrunk and withered by disease, but which in fact had been reduced purposely to this condition, by the persevering pressure of bandages rolled tightly round the whole limb.

Forbidden to lean against the back of a chair or recline at intervals on a couch, and required to walk and sit erect for hours, young females gain an artificial support by their corsets; and in proof of the necessity, if not propriety, of continuing to wear this casement they allege the impossibility after a while of keeping themselves erect at all when they are deprived of it. They have, they say, a feeling of weakness and of sinking almost amounting to faintness, which compels recourse to the artificial support of corsets. These very feelings are proof conclusive both of the mischief done and of the means by which it was accomplished. The extreme feebleness of the muscles of the back which prevents their keeping the body erect, is the result of the continued compression to which they had been subjected. But it would hardly be argued that because these muscles had become feeble from long inaction, as where a person had been constantly in a recumbent posture, the way to strengthen them would be for him or

her, as the case might be, to lie down again and continue the inactivity of the parts in question. A limb reduced in size, and its muscles small and wasted and unable to move it, in consequence of their having been long subjected to pressure in the manner before indicated, could hardly be expected to recover its size and mobility by a renewal of the application which first caused its weakness. And yet either of these courses would be as natural and proper and as justified by experience as the renewed use of corsets by a person who complains of inability to support herself without them.

The law of nature which is but an exponent of the intention of the Creator is clear and without appeal. It is: that the muscles which are the moving parts of the animal economy, by which both locomotion proper is performed and the various postures and attitudes of the body are taken, grow and are strengthened by regular exercise, and become smaller and enfeebled by inaction, and utterly powerless by pressure. All substitutes and contrivances whatever to evade this law are not only ridiculous, on the score of their impotence, but impious in regard to their opposition to the plain intention of the Creator. This reflection suggests a notice of the means for the prevention and removal of the deformities of which the chief causes have just been enumerated.

These latter have been shown to consist in a defective growth and hardness of the bones and weakness and unequal action of the muscles.

MEANS OF PREVENTION, AND OF RELIEF AND REMOVAL OF DEFORMITIES.—As the morbid causes are early brought to bear, we must as early look to their avoidance, and to the means of counteracting their influence. The requisite details with this view will constitute a short code of what may be termed *beauty-training*.

The infant whilst yet in its mother's and nurse's arms is subjected to the disadvantage of unequal motion of the two sides of its body, if, as is the custom, it be always carried upon the same arm, so that the side of it which is at liberty, being more exercised than the other, acquires a greater degree of development. This habit of the nurse may, also, prove detrimental to her; and she becomes "side-bent" or crooked at the same time that her charge is suffering in the back and limbs. The relief in this case is obvious. The alternate use of the arms will prevent either nurse or child from suffering in the manner described.

Parents and nurses, in their eagerness to show off a child to what they suppose to be the best advantage, and to give an idea of its rapid growth, very early make it sit erect. A consequence of this injudicious practice is to bend the weak and

yet flexible spine in a wrong direction, which is apt to be maintained by the readiness of growth of the young bones. The instinctive efforts of the little being itself are the best index of the time when its spine is able to support the head and to keep itself erect on the haunches. Until these are manifest and repeated, it should be kept in a recumbent posture with the head somewhat raised or after a time of half recumbence, so that it shall rest from time to time as on a kind of inclined plane.

The support, on these occasions, of a child, before it is able to sit up with ease, and at any period afterwards when it lies down, should be uniform and equable, so that the head and neck, the region of the shoulders and the loins and hips may rest on a continued surface of slightly elastic substance. There is nothing more wearisome to a nurse nor more apt to deform the child than holding it, as is often done, for hours on the lap or on the arm. Its back is very unequally supported, and whilst one side suffers from pressure the limbs of the other are partially hanging down. Beyond the time required for giving a child food and making the requisite changes in dress, it should never, in doors, be kept upon the knees or the arms of its parent or nurse. If placed on a mattress or on the floor and its limbs left free, it soon assumes the posture which is easiest and most conducive to its comfort; and it can, at the same time, in turning or rolling

about give itself both exercise and the requisite variety of posture, whilst it is being prepared for sitting up and for subsequently more extended movements.

Equally injudicious as the early attempts to make the child sit up erect are those to make it stand before its limbs have acquired the needful strength for supporting the weight of the body. Neglect of this caution will be productive of bending of the legs; and as one may yield more readily than another a leaning to one side and the risk of spinal curvature are to be apprehended. The instinct in children for taking exercise is strong, and early evinces itself by the little being, ere it is able to walk or even stand, creeping along the floor on all-fours. This preparation for ulterior and more extended movements should be freely indulged; and in such a case the child will not be backward in making spontaneous efforts to stand, by first taking hold of some object, and afterwards alone. At first, it will be seen sinking down on the floor almost immediately after having stood up, as if astonished at the novelty of its position; but in reality because its lower limbs are unaccustomed to their new burthen and soon give notice by peculiar feelings of their weakness. After a while the child stands for a longer period, and finally volunteers some movements of progression. All these efforts, I repeat, ought to originate with itself; due

attention being paid, in the mean time, to directing its attention and giving it inducements to move about. But in all cases the mode should be left to the young being, nor should it be forced by artificial support and dragging to walk before it evinces, itself, both the inclination and the ability.

It may seem but little complimentary to the boasted reason of man, for us to point out, as an example for his guidance, the instinctive habits of animals in the treatment of their young. In the first period, warmth and nourishment are all that are given or required; in the second, encouragement, by example, to limited exercise in the movements characteristic of the species. The reference is, however, conformable with sound philosophy, since the points to be enforced are, how growth goes on, symmetry of structure is preserved, and ready movements made, without any artificial aid or prop, bandage here or pressure there, in the young of all animals.

Infants and children in a savage or semi-barbarous state have advantages over those in a more highly civilised community, in their comparative exemption from feebleness of frame and deformities. It is the characteristic of half knowledge to be always inventing, altering, and restraining under the pretence of amelioration. In this state is mankind at the present time respecting physical education. It might seem to learned ignorance

a cruel wrong to leave children totally untrammelled in their dress and carriage; and if for no other reason than because barbarian nations and the poor and the illiterate among their own people, allow them this freedom. These sophists are not even convinced by the results of the two methods of treatment. The weakness and slight deviation from symmetry in a child maltreated after the common fashion, by its being constantly nursed in its mother's or nurse's arms, twisted and tormented and imperfectly supported on the knees of one or other of these persons when it is being dressed, is afterwards increased and the ready cure prevented by ill-fitting, because tight, garments about the centre of the body and the chest and shoulders. The free motion of the limbs in every direction and the equal exercise of the two sides of the body, which would soon restore the strength and correct any slight deviation from symmetry, are either prohibited by parents as ungraceful or are prevented by the restraints of dress. Nor do the evils stop here: the machinery of shoulder straps and back boards, and the more permanent torture of corsets are soon superradded, in the case of the young female. Boys more fortunate, because vanity is not engaged to *improve* their persons, escape these cruel trammels; and yielding to the instincts of their nature, or in more impressive language, we should say obeying the intention of

their Creator, they indulge in various sports and pastimes, and find in these both exercise and strength for their bodies and recreation for their minds.

Surprise is often expressed at the healthy and even robust appearance and fine free carriage of children who have been in a degree neglected by their parents or even entirely deprived of them; and allowed to grow up in indigence, perchance in dirt and rags, with the domestic animals for their company. The destitution of these apparent unfortunates is for them a happy exemption from refined cruelty; and whatever risk they run on the score of moral obliquity, they are gainers in their physical nature by the freedom which they have enjoyed. Though their food be scant, it is at any rate eaten with avidity and well digested, and furnishes a fair proportion of good chyle for the renovation of the blood, which itself is freely circulated in its proper channels, and fully exposed by ample respiratory movements to air in the lungs. It is rendered florid, vivified, and every way fitted to nourish all the organs, including, of course, the bones and the muscles, by its depositing in them the materials for their structure and growth. These remarks would not apply to the children of squalid poverty, who are deprived of wholesome aliment, but to those who receive enough for the wants of the animal economy without clogging its machinery, who exercise their bodies the live long

day without let or hindrance, and who, tossed down on their hard pallet, sleep sound and awake cheerful and refreshed.

What a contrast does the child of wealth and luxurious indulgence present to this picture. The stomach, even before the little being is weaned from its mother's breast, crammed with various indigestible matters, called sweets and good things, or gross meats and gravies, is irritated, and transmits its irritation to all the other organs, including the brain; the sufferings of which are shown in fitfulness, frequent cries and outbreaks of passion. Even that small portion of chyle which is made out of the crude mass taken into the stomach, is imperfectly mixed with the blood, for this fluid does not circulate with freedom, deprived as it is of the increased momentum which exercise gives, nor is it adequately changed in the lungs, poorly supplied as they are with the necessary pabulum of fresh air. Badly because overfed, confined to close rooms week after week, and not of course exercised and having no inclination for exercise, trammelled in the commonest movements, and prevented from yielding for a moment to its instinctive wants of locomotion, this creature of false method and of criminal indulgence has its digestion and growth impaired and its disposition perverted: its organs are feeble; those of support, the bones, wanting in solidity, and those of motion, the muscles

deficient in contractile power. Prevented from running it walks badly: and not even walking enough, its lower limbs are unable to perform their office of supporting the trunk. The arms are for the most part passive, the chest becomes narrow, and any sedentary employment will suffice to give the now weakened spine a wrong direction.

The only chance of restoration, and of acquiring health with pleasing personal appearance is in escape from this imprisonment and these trammels. We sometimes see a boy and a girl of the same family, nearly equal sufferers from these pernicious influences to which in their nursery life they had been both equally subjected. The boy, however, is sent to a school at which he is allowed to mix in the sports of other boys in the fields and play ground; he acquires vigor of frame, freshness and high color of skin, and prompt and easy movements. His sister is retained at home under her fond mother's eye, or she is sent to an approved seminary in order to be trained up in all the accomplishments and graces of carriage and manner befitting her sex and the expectations formed of her. But, in fact, she is transferred from one prison to another, from a primary school, to an academy, of refined torture of her body and distraction of her mind.

Of the direct effects of the fashionable school training on the shape of the female form we can

take, as no bad exponent, the following opinions by Mr. Bampffield.

“Thus the spinal muscles of young females are doomed to inaction by the trunks of their bodies being imprisoned in stiff stays, or their movements abridged and confined by the use of collars, braces, back boards, or by being stretched motionless on reclining boards or school room floors, or they are subjected to long continued exertion, and the use of one posture, which all our muscles abhor, and soon become weary of; by being placed in education chairs or stools, the long form of school rooms, or on the round stool, to practise for hours on the piano-forte or harp, with strict injunction to keep the body quite upright, and menaces of punishment if they stoop or bend in the least. But the muscles must sometimes obey divine, instead of human laws, and when fatigued or weary in the erect posture, must gradually follow the Creator’s law, and seek repose by allowing the body to sink into an inclination to one side or the other, and by laying the basis of lateral curvature, produce the reverse of what human wisdom intended.”

The remedies for these evils are thus indicated by the same author. “Without digressing farther I would observe, instead of stiff stays, back boards, reclining boards, education chairs without backs, military marching, &c., let the boys and girls have no clothes or apparatus to limit their movements,

and when weary, let them sit down on chairs with proper backs, to support the spine, or lay down for rest, or, in fact, seek repose as they find most agreeable, when they are fatigued or can no longer maintain an erect attitude conveniently. Let the girls have a large field or play ground. Let the boys, also, have the range of the country within the sound of the school bell. Let the girls engage in the games of battle-door and shuttlecock, skipping, dancing, and all that they can play at."

Preliminary to a consideration of any other means of obtaining a fine shape and graceful carriage, and, short of these, of preventing deformity, the question of suitable dress must first be settled. If a young girl at school wear stays and corsets, she is at once in the most unfavorable situation for her health, beauty, and even mental improvement. The evils of long sitting and confinement in the school room are increased, and any benefit that would otherwise be derived from even limited exercise is rendered of no avail. The first and indispensable condition, the *sine qua non* for physical comfort and well being of the scholar is loose habiliments; such as will allow, 1. Of the most complete expansion of the chest in the fullest inhalation or long drawn sigh; 2. Of the movements of the limbs in every direction of which they are by their structure and articulation capable; 3. Of the flexion of the body forwards and on either side,

and the semirotation both of the vertebræ of the neck above and of those of the loins below.

During the period of school hours, and these, especially for girls, should be shorter than they generally are, the scholar is to avoid either the awkward stoop in which the head is sunk between the shoulders, and the latter excessively raised, or an attempt to keep in a continued erect posture. A slight flexion of the spine at the loins is natural and diminishes the fatigue from long sitting, whilst part of the weight of the upper portion of the body is to be taken from the spine and pelvis, by resting the middle region of the back or that of the shoulders against the gently curved back of a chair. The seat must be broad and deep, and not so high as to prevent the feet from resting easily on the floor, but allow of the legs and thighs forming a right angle. It will be proper, also, to have the seat either cushioned or made of elastic cane.

The fashion of chairs with high narrow seats and perpendicular backs, called Cooper's education chairs, displays ignorance of animal mechanics and of the movements of the body. Stooping is almost necessary to a person thus seated, and yet the attempt to take this posture would throw her off her balance, as her feet do not reach the floor. The lower limbs being pendent drag the body and increase the feeling of fatigue at the loins. The

muscles of the back, both those in common use and the accessory ones, are kept in excessive action and the tendency to spinal curvature is greatly increased. When the legs hang down during a long continued sitting, and the thighs have not a sufficient support, the latter acquire a crooked form. A celebrated German physician alleges that he has seen this kind of deformity of the limbs produced in the children of several families from a similar cause.

If the young person is of a weakly frame, she should, so far from being compelled to sit on straight back chairs or on forms or stools without backs, be allowed to sit on a chair made with a reclining back and stuffed tolerably hard with horse hair. "When there is an evident tendency to deformity, the back of the chair may be stuffed so as to fit the natural curves of the spine, but it does not require to be formed with this accuracy when used as a means of prevention." By the aid of a hinge or spring in the seat, the back takes any degree of declination that may be thought desirable; so that the girl, after the fatigue during school hours, may be allowed to assume a reclining posture without altering much the relative position of the spinal column, and thus to relieve the muscles which poise the body, without, at the same time, hazarding the symmetry of the form by allowing

it to fall into an injurious or ungraceful attitude. When by such means rest has been obtained, the erect posture may be resumed.

A mistaken notion prevails and is too rigidly acted on in seminaries of learning, and indeed, at home, by indulgent parents, that a reclining posture or lying down in the day, in the intervals between study or after active bodily exercise, is a sign of indolence and ought to be discountenanced and prohibited. We have shown that this posture is the one in which all the muscles of the body including those of the spine are at rest; and it is that which after fatigue from protracted sports or labor we most readily, one might say, instinctively seek. The laborer in town or country will be seen, after having taken his simple meal, to stretch himself out at full length during the noon-tide hour, and perhaps sleep the while, and rise again refreshed and enabled to go through his toil with readiness and ease for the remainder of the day. But other examples readily occur, which will be regarded as more to the point, by their showing that frequent reclining, in alternation with exercise, is neither unfavorable to symmetry nor to a ready assumption and easy preservation of the erect attitude. The Indian will spend most of his time not taken up with war or the chase, in a reclining or at least lounging posture; and yet we all know that when once up and in motion his figure seems to be

as straight as one of the arrows in his quiver. The people of the eastern world sit, not on straight backed chairs, but on their hams, on mats and commonly cushions of some kind or other, and often recline on their divans, slightly supporting themselves on their elbows and on cushions; and yet, as we see in the Turks, they are remarkable for their erect standing and gait. Among the ancients, even at their repasts, the reclining posture was the most common, and that too by men, who, in their gymnastic games, could display an agility and grace of movements, and, in war, a strength in bearing up under their heavy armor and in the use of their weapons, which would shame the most practised martinet of the present day, who considers the slightest stoop at any time to be a mark of indolence, if not of childish weakness.

Having indicated the preventive measures of a negative nature against the loss of symmetry of form, I shall next specify those of a more positive, and at the same time in a measure curative, kind. It may have been inferred from the tenor and actual substance of preceding remarks and admonitions, that I regard machines of every description for the prevention of deformity or for the cure of bad habits as not merely useless for obtaining the desired end, but as positively injurious and to be avoided accordingly.

In every case of weakness of the muscles of the

back, and inability to maintain without discomfort the erect posture, assiduous friction, as a kind of passive exercise, should be practised over and on each side of the spine, in its entire course; first with the hand of an assistant, and then with a flesh brush or coarse flannel. A momentary impression from a spout bath of cold or, in very weak persons, of tepid water may advantageously precede recourse to friction.

The hints and advice which follow, are given under the supposition that we have to treat young persons with frames merely feeble, or in whom there may be evidences of incipient curvature of the spine without fixed pain or decided constitutional disturbance. If a particular spot corresponding with the distortion of the spine be permanently painful, and, still more so to the touch, and there be fever, then the cure demands a regular and connected medical treatment which it does not comport with my present plan to introduce at this time. I refer to this state of things now in order to caution against any active exercise during its continuance. Then rest in a recumbent posture will be an appropriate precursor to the use of curative means, among which, however, we must not include any of the various machines and mechanical contrivances which have been at different times extolled for the purpose.

The various attitudes and movements demanded

for health, agility and grace may be classed under the heads of, 1. Exercise taken in the common sports, spontaneously engaged in by children and youth. 2. Methodical exercise by gymnastics or callisthenics, and by dancing.

The first class of exercises should be not only allowed but encouraged, by adequate space and time being furnished for its indulgence. Boys, in their different games of running, wrestling, playing ball, and hoop, &c., whilst they amuse themselves, call at the same time the several muscles of the trunk and limbs into successive and alternate action; a condition this which should be observed in every system of bodily exercise. Insipidity if possible is to be avoided; for unless the mind be attentive to and interested in the body's movements, these latter will be productive of comparatively little good. Girls at school unhappily realise in their own case the truth of this maxim. Certain false notions of grace and feminine reserve prevent their engaging in more than the most formal and limited exercise, which is, therefore, monotonous and heartless. The intervals of study are not recreations to them, where every movement must be graduated by a particular scale of a school supervisor. They are in continued exhibition, unless they be allowed to engage freely and without a feeling of restraint in various bodily exercises for amusement.

Whilst thus recommending freedom from continuedly oppressive and needless restraints, it does not come within the scope of the most liberal in these matters to advocate, even by implication, any vulgarity in sports, any more than in language. It has been properly said, that vulgar exercises lead to vulgar associations; but let it be added that *ungraceful* are in reality *vulgar* motions; and that the true nature of these is not altered by fashion nor by fashionable constraint. The gambols of childhood can never be called vulgar by the most fastidious; nor should the various sports of adolescence in which every movement of the body is practised be more liable to the imputation. They cannot be if yielded to under the influence of ingenuous feelings and properly regulated minds. Superintendence on the part of the teacher is so far necessary as to prevent continued or excessive exercise beyond the strength of the scholar, and, also, to induce the latter to take the requisite variety. Precautions in this respect and the want of space for play grounds in towns for young persons at school, especially for girls, render a methodical exercise both proper and necessary. By these, also, a tendency to deviations from symmetry of form and weakness of any part of the locomotive apparatus are more certainly prevented than when exercise is irregularly taken, according to the varying impulse and feeling of the scholar.

Of late years, in various parts of Europe and in the United States, greater attention has been given to these methodical exercises, which have received the name of *Gymnastics*; and when modified to suit the greater delicacy of frame and less extensive and active movements of the other sex, that of *Callisthenics*.

Details of the mode in which these exercises are taken cannot be expected here. The reader should be aware, however, of the fact, and it is an important one, that they can be directed in such a way as to give strength and muscular development to any particular part, whether it be the chest or the back, the upper or the lower limbs, according to the series of movements and attitudes regularly made. The following account of the beneficial effects of regulated gymnastic exercises in imparting vigor, strength, and vivacity of movement to a body, early, and as it would have seemed, incurably feeble, will serve for illustration and encouragement.

When three years of age, the subject of this brief history could scarcely stand; at five, he walked badly, and supported by leading strings; and it was only after dentition, at seven years old, that he could walk without assistance; but even then he fell frequently and could not rise again. Given up by the physicians, he continued in this state till the age of seventeen, when the loins and

lower extremities could scarcely support the upper part of his body. The arms were extremely weak and contracted, the approximation of the shoulders diminished the capacity of the chest and impeded respiration; the moral faculties were quite torpid, and, "in short, nature was at a stand-still." In the month of November, 1815, this unfortunate youth was presented to Mr. Clias, the celebrated superintendent of a gymnasium, then at Berne in Switzerland, as he afterwards was of others in Paris and in London. On being admitted, his strength was tried, and his pressure on the dynamometer was only equal to that of children seven or eight years of age. In ability to pull, ascend the ladder, and jump, he was utterly deficient. He ran over the space of a hundred feet, with great difficulty, in a minute and two seconds, and could not stand when he had finished. Carrying a weight of fifteen pounds made him totter, and a child of seven years old threw him with the greatest facility.

A person of the other sex, thus enfeebled, would be thought by a committee of erones and mantua-makers, to whom probably she would be consigned, to require, of absolute necessity, the *support* and *comfort* of corsets and busks. Her physician would prescribe tonics and sea bathing, and a generous regimen; no bad things in their place, and with suitable hygienic aids; but

quite unfitted to prevent the increasing debility and superadded deformity from the use of tight lacing, and the want of exercise. But to return to the poor feeble youth. Was any effort made to strengthen his back by compression of its muscles or to take off from the weight of his head and chest by various mechanical contrivances? Captain Clias did not put faith in the doctrine, that to give muscles strength, they must not be used at all; but he believed that the feeble and imperfectly developed ones of this young invalid might be made to grow and acquire strength on the same principle as that by which the legs of a dancer and a porter, and the arms of bakers and boatmen become full, muscular, and strong. His scholar was subjected to the gymnastic regimen for five months; after which period he could press fifty degrees on the dynamometer: by the strength of his arms he raised himself three inches from the ground, and remained thus suspended for three seconds; he leaped a distance of three feet, ran a hundred and sixty-three yards in a minute, and carried on his shoulders, in the same space of time, a weight of thirty-five pounds. Finally, in 1817, in the presence of several thousand spectators, he climbed to the top of a single rope, twenty-five feet high; he did the same exercise on the climbing pole, jumped, with a run, six feet, and ran over five hundred feet in two minutes and a half. Subse-

quently when he became a clergyman, in a village near Berne, he could walk twenty-four miles on foot, without incommoding himself; and the exercises, which he always continued, have given him, in place of his valetudinary state, a vigorous constitution.

The annals of Fellenberg's school, at Hofwyl, abound with examples to the same purport as the above. The reader of ancient biography need hardly be reminded of the steps successfully pursued, by both Cicero and Cæsar, who were each of them, in early life, of delicate constitution and feeble body; but who were restored to vigorous health by gymnastic and other exercises perseveringly employed.

VARIOUS EXERCISES.—Gymnastics, or exercises methodically employed, must be proportioned in their duration and extent to the age, the sex, the constitution, and the actual state of the person who is to become the subject of them. The great ends proposed by their use are to increase the freedom of the joints, to favor the play and development of the muscles, to strengthen the body, and to facilitate standing and moving in any attitude without a loss of equilibrium. These exercises teach, also, at the same time to brave danger and to overcome obstacles which would deter the feeble and induce timidity, because of feebleness. They

have been divided into three; 1. Of the Lower Limbs; 2. Of the Upper Limbs; 3. Into Mixed Exercises, in which both the trunk or body proper and the limbs are all brought into active play. This division, of course, conveys the idea of certain parts of the body being chiefly but not exclusively exercised. Any active movements of either the upper or the lower limbs will exert an effect on the trunk, both by means of the muscles which connect them severally with this latter, and also, by the jar and motion communicated to all the internal organs.

Walking, running and jumping, and balancing on the feet, come under the first division. To some it might appear as if walking "comes by nature," and would not require the aid of the gymnastic teacher. The differences pointed out in a preceding page between the Irish and the English peasant, both of them walkers, will show that there is a healthy and graceful, as well as an awkward, fashion in this kind of exercise. To walk well is, in fact, a great art, which deserves the attention of parents for their children, at an early age of these latter. If any person will try the different modes of walking, by putting the heel first to the ground and then letting the sole down, or by placing the whole surface of the sole at once, or, by a tripping step, resting mainly on the ball and great toe, he will be sensible of the great dif-

ferences in the degree of exercise given to the muscles of the leg and of their development, and also of the relative ease and gracefulness of carriage. In the first manner, the head and chest are thrown back; in the last, the body inclines forwards and the shoulders are slightly stooped.

Compatibly with grace and ease, the foot, in walking, should be entirely raised from the ground at each step, whilst the knees are straight and the toes slightly inclined downwards: the fore part of the sole will then touch the ground first, but the whole sole must immediately afterwards rest on it, so as to give the requisite support to the body, whilst the other foot is being raised and advanced in a similar manner. The walk should be firm and forward, but not crawling, jumping, waddling, nor staggering; the knees and the ankles respectively must not touch each other. The length of the steps will be regulated by the size of the body, and particularly of the lower limbs; so that the body may not lose its balance..

Some of the movements of which walking is compounded, should be practised by young persons. Of these, standing on the heels and stepping at first forwards and afterwards backwards, are a good means of exercising the muscles in the outer and fore part of the leg. The backward movement has, also, the additional recommendation of throwing the head and shoulders backwards

and of expanding the chest; and thus of correcting a tendency to a stoop or anterior curvature of the spine. The other and antagonist movement, to which we tend in the act of walking just before we raise the foot from the ground, is to stand nearly on the points of the toes, and then step either forwards or backwards, or laterally; an exercise which greatly strengthens the muscles of the calf of the leg and the joints of the toes, and is preparatory to that of running and of jumping. It also habituates one to preserve an equilibrium on the narrowest basis. In the familiar and excellent exercise with the skipping rope, the body chiefly rests on the toes and fore part of the sole of the feet.

The *double step* and the *triple step* are movements of progression made with greater rapidity than in the ordinary walk.

The cross step, which is performed by alternate steps to the right and to the left, sometimes one leg going before and sometimes behind the other, serves to render the joints of the knees and of the lower limbs generally flexible, to fix the position of the body at any moment, and to give some grace to the shoulders.

Confirming what has been said of the advantage, in exercise, of alternate motions of the different orders of muscles, the *broken step* may be added. It consists of three quick paces and three in a slow

trot. After being a little accustomed to it, one may travel, as a soldier does on a forced march, six miles an hour, and continue at this rate for several hours successively, without being much fatigued.

After the stress so repeatedly laid on the necessity of freedom from any restraint of dress, which can interfere with the contraction of the muscles and the motion of the joints, it may seem superfluous to say, that, for walking to produce its good and pleasurable effects, and for the movements above described to be made with ease and utility, well fitting shoes of soft and flexible leather, and soles not too thick, should be worn. It may not seem equally evident to all, that walking cannot be performed gracefully, nor without risk even of awkward carriage, if not deformity, being induced, unless both the trunk of the body and the upper limbs be exempt from any band or ligature, either separate or forming a component part of the dress, which might prevent, ever so little, the free play of the muscles.

In walking, the arms should swing lightly, and without any visible effort, so as to allow of their balancing as it were the body. It is only when by any mischance one is deprived of their aid, that their importance in this way becomes fully evident. A walk in slow and measured pace may for a short time be taken, with the arms folded on the chest, but if prolonged or changed into quicker step, the

feeling of awkwardness in movement and of fatigue will soon be experienced. Still more irksome and even painful would be the rapid progression, and if rapid it must be compulsory, of a person whose arms were tied down to the sides. A man thus situated and compelled to walk far and at a brisk gait, could not but excite our compassion, even though we knew that he was a criminal. What must we think then of the penalty of a like nature, which fashion imposes on her female votaries, who, by the compression exerted on the muscles of the chest, which pass on each side to the arms, and by the ligatures of shoulder straps and of the sleeve at the arm pit and just below the joints, as effectually prevent the free exercise of the upper limbs as if they were tied to the body by cords similar to those which bind the culprit.

It is, also, necessary for easy and graceful movement and, indeed, for health and bodily comfort, that the back and loins should not be pressed and their muscles either prevented from contracting at all or allowed to contract partially and unequally. The spine, we have seen, is not a rigid and immoveable column; but a pliant and elastic chain of bones, which at each step must be allowed to undergo some slight deviation from the perpendicular, the more especially when a person is walking on uneven ground. The jar is likewise much greater in walking, when the spine is kept by the mechan-

ism of dress in a measure immoveable, and the vibration from the impulse of the feet striking the ground is communicated too readily along the bones to the head, which suffers accordingly.

If the fingers, or more properly the thumb, of each hand be applied to any part of the spine, from between the shoulders down to the pelvis, this column will be felt to undergo some motion from side to side, in a kind of semi-rotation corresponding with every step made in walking. If the spine be not allowed to be thus moved by the muscles which pass from it downwards to the haunches, progression takes place by the motion of the hip joints alone, and walking is both more wearisome and awkward. The gait is a rolling or rocking one; and the body moves like a mechanism, the parts of which are badly hinged, in place of its characteristic light and springy step. To the most unpractised and uncultivated eye, the difference between the stiff and mincing gait of a fashionable lady, whose body is incased in stays, and the light agile step, and graceful and expressive movements of a girl, who is untrammelled in this way, and whose muscles have been freely exercised, is at once manifest and greatly to the advantage of the latter.

Running and Jumping, though exercises more especially calculated to strengthen the lower extremities, call the muscles of the trunk of the body

into active contraction and increase the activity of the circulation and of respiration.

EXERCISES OF THE UPPER EXTREMITIES.—These are, also, numerous and diversified; viz. the *dumb bells*, which should not be of such a weight as to cause any strain upon the shoulders or wrists when they are held in the hand and swung to and fro; *pushing, pulling, lifting*: the two latter should be practised with great caution and under experienced guidance; *battle-door and shuttlecock; throwing quoits*: the left and right arm should be used alternately in these games. The use of the triangle is one of the best exercises for the arms, because both are equally and simultaneously called into action at the time: it is, also, one of the best preventives against lateral curvature of the spine, because it calls into vigorous contraction the spinal muscles of each side. The triangle is made of a piece of firm wood, three or four feet in length, and an inch or two in diameter; to each end of which a rope is tied, the latter being secured to the ceiling of a room on a hook or staple. The height of this simple apparatus from the floor will be at first just enough to require the person to stand on tip-toe, so as to be able to take hold with both hands, and with a firm grasp of the stick, and drag or pull on it. Afterwards, it may be raised to such a height as to require its being caught at by

a slight jump or spring, and then to allow of the body, thus suspended, swinging by the hands.

Another exercise, well calculated to give strength to the muscles of the arms and shoulders, and back and chest, is that on the *parallel bars*. Where there is already an elevation of one shoulder and slight tendency to curvature, it is not, however, equal to the triangle in the beginning of a course of gymnastic training.

OF THE MIXED EXERCISES, we may mention *wrestling, fencing, swimming, skating*, the *skip-ping rope*, when held by the person skipping; *climbing*, on the ladder, rope, mast, &c., *carrying, dancing*, &c.

In Paris, there are swimming schools for young persons of both sexes, which happily, also, are the fashion. A girl, by learning to swim, not only takes a wholesome exercise, both calculated to give freedom of motion to the limbs and to correct tendency to spinal deformity, but she also acquires an accomplishment which may enable her to save her own life from danger under circumstances which no human foresight can always guard against.

Dancing, as a means of exercising to advantage the body and limbs, and of giving to a certain degree, an easy movement and carriage of the body, is properly a part of good physical educa-

tion. Learned with the aid of music, it contributes to a general perception and feeling of harmony, and is an aid to domestic sociability, by bringing all the younger members of the family into a pleased and joyous group. But, dancing, to be useful to the full extent of which it is susceptible, ought to be taught on a more extended plan than that which makes it to consist of formal movements and strained and unnatural attitudes. Under the guidance of a cultivated classical taste, and with the examples of ancient art, in groups of bas-reliefs, and the paintings on Etruscan and Grecian vases, young persons might acquire an ease and flexibility of movement, the utmost facility at assuming every variety of posture and attitude expressive of the different emotions of the mind, and a readiness in combining a number of individual figures so as to form the most picturesque groups.

A knowledge of this kind of exercise and graceful movements does not imply, nor need it lead to those exhibitions at balls or parties, against which so many estimable, and some by no means ascetically disposed persons have a strong repugnance. Children may, and should learn to dance, as they would learn correct elocution and vocal music, without its being supposed for a moment, that they must afterwards lose their health and their freshness in dancing at balls, any more than they would become professional declaimers and actors, or public singers.

In fine, I would say, that without attaching any special importance to the mere art of dancing, it is highly desirable that the young of both sexes should be induced to learn with pleasure the various exercises by which they can walk and move with ease and grace, spring if need be from crag to crag; cross on a narrow plank over a deep ravine or rapid stream with steadiness, and jump with the promptness of instinct out of the way of any sudden impelling power which would in an instant more have crushed them to death. What is called presence of mind, in the hour of danger, can never be expected, unless from those who have the ready consciousness of the complete subservience of their bodily movements to their mental determination; and this must have been the result of long and variously practised exercises.

DEFORMITIES OF THE CHEST.

The walls, as they have been called, or boundaries of the chest, which is technically called thorax, were described at page 117. In order that the lungs contained in this cavity should be allowed the requisite expansion in breathing, full liberty must be given to the thorax to be dilated at each inspiration or drawing in of air. The spine behind, the ribs on each side, and the breast bone in front, must be in suitable proportion and connection

to each other, and all of healthy firmness of structure and shape. Of the muscles of the spine I have already spoken; also, of those expanded over the chest. In addition to these last, there are muscles which connect the ribs together and pass in two layers; one layer from above downwards, the other from behind forwards, from edge to edge of the ribs. They are called intercostal muscles, whose function consists in either elevating or depressing the ribs, according as the movement is of inspiration or of expiration.

The shape of the chest is conical, each rib from the first to the seventh constituting an arch, and each in the order downwards as far as the seventh, being longer than those above it. The chest is flat before, at the breast bone, and behind at the spine; and it is curved on its sides owing to the convexity of the ribs. On a horizontal section of this cone the largest portion would fall in the region of the seventh or eighth rib; and consequently the compression or expansion of this part would produce the most remarkable changes in the decrease or increase of its contents.

The change in the size of the cavity of the chest from behind forwards, is by the rise of the ribs and their protrusion, together with that of the breast bone, forwards. The alternate widening and narrowing of the chest has been compared to the opening and closing of a pair of bellows. But the

most important change in the capacity of the chest in breathing, is accomplished in the direction of its long diameter, from above downwards, by the agency of the great muscular partition, the midriff or diaphragm, between the thorax and the abdomen, already described. (p. 117.) When not in action it forms an arch the convexity of which is at its upper surface and far up in the cavity of the chest. But during its contraction, in inspiration or drawing in air, it loses its arched form, and presents the appearance of an oblique plane. By this change it descends from a line even with the fourth to that of the seventh rib; the lungs follow it, and by their greater capacity and enlargement allow of the introduction of more air; whilst the contents of the abdomen below, as the stomach, liver, &c., are pushed downwards. At the moment of the inspiration of air, by the elevation and projection of the ribs and breast bone, and the descent of the diaphragm, if the hands be placed over the region of the stomach, the organs beneath and the muscles covering them and arranged under the skin, will be felt to protrude. A full and regular healthy inspiration is impossible, unless there be this movement of parts; descent of the diaphragm and a change and some protrusion in the position of the stomach, liver, and other contiguous organs of the digestive apparatus, by which they are forced outwards and somewhat downwards. Dur-

ing expiration, again, or breathing out of the air, the great flat muscles in the front of the body contract and push back the organs behind them, which rise upwards, whilst the diaphragm also retires and ascends into the cavity of the chest? The more laborious breathing and the oppression from speaking aloud or singing, after a meal, can now be readily understood. These are effects of the difficulty of enlarging the dimensions of the thorax and the capacity of the lungs, owing to the resistance which a full stomach offers to the descent of the diaphragm or midriff.

In what respects does tight lacing, with corsets and busks, alter the shape and diminish the capacity of the chest? The figure of the chest is, we have seen, that of an irregular cone with a convex projection on each side, and flattened before and behind. By compressing the chest with corsets, the figure is changed to a cylinder; the lower and projecting part being forced in, so as to make its transverse diameter no greater below than above. This compression being permanent, at least during the day time, the ribs cannot be raised upwards and brought outwards, as in the common and natural course of things they ought to be when air is taken into the lungs during inspiration. But the lateral compression acts injuriously, also, by reducing the convexity on each side in such a way that the figure of the chest is that of a regular

circle; and its capacity in this direction from side to side is diminished, without any compensating augmentation in the diameter from front to back, that is, from the breast bone to the spine.

If the restraints imposed were restricted entirely to the bony sides and muscles proper of the chest, respiration could still be performed with tolerable ease by the motion of the diaphragm in the manner just detailed. But, as the compressing and binding apparatus extends down over the loins behind, and in front over all the soft parts, or the organs below the chest, it becomes like a solid and unyielding wall, which, by its resistance to the protrusion of these organs, prevents them from yielding to the diaphragm above in its attempt to descend and to enlarge the cavity of the chest. If an additional resistance, by eating a meal and filling the stomach, be now offered to the descent of the diaphragm, the oppression becomes intolerable and alarming consequences occasionally supervene. Females, generally, if they have been tightly laced, are glad to procure for themselves relief after a full meal, by loosening their corsets and the outer dress, which is sometimes equally tight.

A person, then, who is subjected to this kind of torture, more prejudicial to health than the Chinese fashion of small and cramped feet, must necessarily breathe with difficulty, since the chest

can neither be enlarged in its diameter horizontally by the elevation and protrusion of the ribs, nor longitudinally by the descent of the diaphragm. The blood cannot be freely circulated nor suitably changed in the lungs; and hence a train of evils which have been distinctly mentioned in former parts of this work. The chest becomes deformed: it is flattened at the sides in place of being convex; it is a cylinder, as small below as above, in place of being greatly enlarged at the very part where the pressure of the corsets is greatest. The ends of the ribs which are connected with the spine between its vertebræ are unduly driven inwards; and as the force can hardly be precisely equal on both sides, the spot at which the pressure from the end of a rib on the spine is greatest will be that at which this latter will yield, and a slight curvature will be begun, which the whole process of tight lacing will singularly tend to increase, in the manner specified in preceding pages.

The muscles of the chest being partially paralysed by the prolonged pressure of corsets, the arms cannot be moved nor exercised with freedom, nor the chest itself expanded and strengthened as it is by the exercise of the muscles common to it and the arms. The spine, owing to the inaction of its muscles by pressure, becomes weak and unable to be maintained in the erect and straight position; and it readily yields to any cause of curvature and distortion.

Nor are these all the grievous consequences of a permanent and wide spread fashion. In the space formed by the concavity of the diaphragm above and the lower ribs on each side are situated the liver, chiefly to the right, and the spleen and a part of the stomach on the left. By the diminution of the transverse diameter of the chest below from the pressure of corsets, the ribs of the two sides are drawn towards each other, and necessarily compress with great force the liver, stomach, and spleen, causing pain in those parts, and disturbance of function. From this fruitful source come indigestion with discoloration of the skin, and not unfrequently jaundice. The blood not allowed its free course nor to flow in suitable supply to some of the organs just mentioned, is accumulated in the head, and gives rise to a sensation of fulness, violent pain, and sometimes convulsions. This fluid determined in other and different directions, there follow disorders of a serious and even alarming nature, to which one can here but barely allude; but which a young person, who has any regard to her usefulness in subsequent situations in life, should, from a sense of duty, certainly endeavor to avoid.

Another variety of lateral deformity of the chest, in which the sides are flattened, is accompanied by an anterior projection of the breast bone, which is narrow and sharp, and resembles this part in a

bird; hence a person thus mis-shapen is said to be *chicken* or *pigeon breasted*. The spine at the same time is more or less deformed, either by lateral curvature, which is the most common, or by a projection backwards.

The anterior compression in which the breast bone is sunk in or hollow, as it is termed, originates from a continued bent posture; and hence it is common in tailors, milliners, and seamstresses generally, and shoemakers. The pressure of the last against the breast contributes not a little to this deformity in shoemakers.

In declaiming, as we are prone to do, against the excessive cruelty of keeping children, from six to ten and twelve years of age, at work all day in factories, on their feet and stooping whilst thus engaged, we forget the scarcely less reprehensible practice of fixing children at school in a particular posture for hours together. In addition to the deformities of the spinal column, before described, those of the chest are no uncommon results of this tyranny.

Students, clerks, and all those whose occupations require them to stoop, and who do not counteract the effect of this habit by proper exercise, are subject more or less to the hollow breast bone (*sternum*.)

The pressure of busks added to the general pressure of stays or corsets, appears to be a great cause

of this deformity among women. "It is much more common than is usually supposed."

The prevention and cure of these deformities are the same as of spinal distortion. Regular and varied exercise in the open air and that systematic kind by gymnastics, and good nourishing food, are the chief means for the accomplishment of this end. A perseverance in these for a length of time has been followed by a cure of cases of the most discouraging nature. The Indian exercises, by the use of what is called the Indian sceptre or Indian club, have been found very serviceable.

Reference has been made to the exercise of the voice as a means of expanding the chest and strengthening the lungs. Among the means for accomplishing this object are the shouts of children in their favorite sports, which ought to be encouraged rather than prohibited, during their allotted and admitted period of amusement and recreation. Reading aloud and singing are useful on this score, independently of the pleasure which a well trained voice is capable of affording to others and of ministering to one's own comfort and advancement. These ought not to be left, as they generally are, to the whim or choice of the young person. Reading aloud and measured declamation and singing should be as essential a part of the daily school exercises as writing and recitations in grammar. It may be asked, whether

a boy or a girl, who has not a musical ear, should be required to sing. For the sake of exercising the lungs and improving the intonations of the voice they certainly ought to learn to sing. Subsequent displays and practisings, after they leave school, will depend on the degree of talent or taste with which nature has endowed them for musieal attainments.

In all the cases in which active exercise is had recourse to, either for the prevention and removal of deformity, or with a view to augment the strength of the body at large, methodical frietion and shampooing and bathing are useful if not absolutely necessary adjuncts. On these subjects I have had occasion to dilate in another work, published a few years ago; and to that I would refer the reader who may be curious to learn the value of the different kinds of Baths, used as well for the purposes of hygiene as for the cure of diseases.

In the preceding pages I have not given any statistical returns, which would show the number of young persons of the other sex, who suffer from curvature of the spine, in consequence of a neglect of the laws of growth and exercise. On this point the evidence is unhappily too conclusive. Not only physicians but persons of common observation and experience are aware of the magnitude and extent of the evil. It will be sufficient, in conclusion, for me to cite the experience of three

writers in different countries on the prevalence of spinal deformities. Dr. Warren, of Boston, a gentleman of enlarged experience and known surgical skill, says: "I feel warranted in the assertion, already intimated, that, of the well educated females within my sphere of experience, about *one-half are affected with some degree of distortion of the spine.*" Lachaise, in his work, on Curvatures of the Vertebral Column, when speaking of the lateral curvature, expresses his belief; that, "out of twenty young girls who have reached their fifteenth year, there are not two who do not exhibit very manifest traces of it." Dr. Forbes, a learned and distinguished English physician and writer, says; "We lately visited, in a large town, a boarding school containing forty girls; and we learned, on close and accurate inquiry, that *there was not one of the girls who had been at the school two years (and the majority had been as long) that was not more or less crooked!*"

CHAPTER IV.

OF EXPRESSION—THE MUSCLES GOVERNED BY THE BRAIN ARE THE INSTRUMENTS OF EXPRESSION—ITS ADVANTAGEOUS DISPLAY DEPENDENT ON A CULTIVATED MIND AND FREE EXERCISE OF THE MUSCLES.

IN the last chapter I have spoken of the physical impediments to a proper exercise of the locomotive apparatus, and of the consequent injury to health and beauty. In the present one, it will be my endeavor briefly to point out the animating influence of mind over the organs of motion, and to show how far expression depends on health and is itself a cause of, and a necessary support to beauty. Vain will be the finest proportions of form and face, and rounded and symmetrical limbs, unless there be a harmonious combination of movement in all the voluntary muscles concerned in attitudes and gestures, and in the play of the features. Living beauty, even in repose, can never be entirely divested of the irradiation of mind through the corporeal frame; it speaks by this outward expression a natural language, which is un-

derstood by all, and to copy which though imperfectly is the constant aim of the painter and the sculptor.

The material centre and origin of these beautifying impulses is the brain enclosed in its bony case the skull. The cords for conducting these impulses are the nerves; one series of which transmits the orders of the mind from the brain to the muscles, as in all the voluntary movements: another series transmits impressions made on the surface and at the several senses to the brain, where they are converted into sensations, perceptions, and ideas, and constitute materials for thought and motives to future action. Continuous with the great nervous mass constituting the brain is a long cord of a similar structure, and called the spinal marrow, which fills up the canal made by the cavity in each of the bones that form the spine, from the first vertebra above, articulated with the skull, down to the last, which is joined to the sacrum. Nerves like so many whitish cords pass out through different orifices at the basis of the brain to the senses, as of sight, hearing, &c., and to the muscles of the face; others from openings between the vertebræ composing the spine, mentioned in the last chapter, both to the skin and to the muscles of the trunk and limbs.

Illustrative of the governing influence of the

brain over the voluntary muscles are the facts of abolition of movement in consequence, 1. of compression on the brain by a depressed portion of the skull, after fracture of this part; 2. of concussion of the brain by a violent blow on the head, or by a fall or even jumping from a great height, although the head may not have struck the ground; 3. of effused fluid, blood or serum, as in apoplexy, pressing on a portion of the brain. Contrasted with this state of the brain, but still confirmatory of the influence which it exerts over the muscles, are the strong and violent convulsive movements witnessed in various diseases, in which this organ is greatly irritated, either by an undue determination of blood to it, or by its being the recipient of irritation from another part, as from the gums in teething, the stomach from unripe fruits, &c. Again, what a difference is exhibited between the firm and quick step and varied muscular movements and play of the features in a person of intelligence and lively feelings, that is, of one whose brain is healthy and in active exercise at the time, and the uncertain walk, vacant look, and almost paralysed muscles of an idiot, whose brain is originally defective and incapable at any time of healthy mental manifestations!

Of the necessity of the connecting chain of nervous matter between the brain and the muscles, for the performance of voluntary muscular move-

ments, even the uninitiated in anatomy and physiology must be readily aware. Injury of the spinal marrow, from a violent blow on, or fracture of, the spine, is followed by palsy of the limbs and of the voluntary muscles of other parts which are supplied by nerves below the spot injured. Paralysis of one side of the face is sometimes the consequence of a tumor pressing on the nerve which is distributed to the muscles of this side. An awkward posture, even, by which protracted pressure has been exerted on the chief nerve of a limb will cause a temporary numbness and inability to move this latter.

The conditions, therefore, for the requisite irradiations from the brain on the muscles, in order that they should be excited into motion, in other words, for the mind to call into exercise the limbs and body generally according to the determinations of the will, are a well formed and healthy brain, and an uninterrupted continuity of nervous cords from it to the muscles.

From the first step made by a child, in its attempts to walk, on to the rapid movements in the foot race and the varied and complex ones in the dance and the exhibitions on the tight rope, we find proofs of the dominion of the brain over the muscles, of bodily movements being the result of mental exercise. The concentration of muscular power under strong volition and mental excitement

at times surprises us; as when we see men of a rather puny frame display strength in a given effort, prompted thereto by violent emotion, of which, in common, they are utterly incompetent.

The continued attention, which implies continued exercise of the mind, necessary for a person to go through a series of complex movements of any kind is felt and admitted by all who perform them. Let the attention be diverted, or confidence in their own powers diminished, so that the irradiations from the brain on the muscles are interrupted or rendered irregular, confusion follows; whether it be in the master of legerdemain, the performer on the tight rope, or the graceful follower of Terpsichore. The fingers of a practised player may still travel over the piano; but if the mind be diverted ever so little from its present purpose, the government and direction of these fingers, they will not give the assured though delicate touch, nor procure that quick succession and alternation of notes requisite for a finished execution of the piece.

Bodily movements are imperfect either by want of exercise of the moving powers, the muscles and joints, or by positive impediment and injury to these parts. The first is owing to deficient mental activity; there is no volition displayed, no irradiation from the brain on the muscles. The indolent and lazy, and they who spend their days at the desk or in study and their evenings in list-

less lounging, suffer from this cause. Others, and they are a large class, although they will muscular action, yet they do it unequally, as where they bend over work in their hands, which, together with their arms, are fully perhaps fatiguingly exercised, whilst the trunk and lower limbs are entirely quiescent, and it may be twisted into a constrained and unnatural posture. Under this head come a majority of those engaged in manufactures and the arts. A third and all important class are they whose bodies are so compressed that the muscles cannot contract with freedom, and consequently cannot obey the commands of the will, even at a time, as when walking, running, or dancing, in which it is intended there should be an entire subservience of these muscles to volition. The persons thus suffering are a vast majority of the weaker sex from before the time in which they enter their teens until fifty years of age.

It follows from the premises briefly sketched, that there can be no regular and methodical bodily movements without the mind having been first and continuing to be during the period, exercised in guiding and urging the instruments under its direction; viz: the muscles and through them the bones at their joints. But not only are the muscles all over the body, those of the trunk, limbs, and face, the servitors of the brain in its state of common functional exercise, that is, for locomotion and

movements dictated by the intellect merely; but they are, also, the exponents of the varying conditions of its other different faculties, as of its sentiments, emotions, and passions. It follows, that if the mind be exercised through its faculties—intellectual and moral, it will of necessity, during the entire circle of such exercise call into play, in succession and alternation, all the moving instruments, or the muscles of the body; and that the natural language or expression evinced in the tones of the voice, and in gesture and locomotion, can never be fully given unless all the various powers of the mind be developed and brought into play. Every feeling or emotion, every propensity when it seeks for its gratification, gives its peculiar and characteristic expression to the individual under its influence: nor is it possible to simulate this outward expression without a temporary imitation of the frame of mind which originally begot it. The actor and the orator are never successful, unless by this double imitation. Without it they become buffoons. The artist cannot embody the expression of character, whether of loveliness, of intense passion, or high resolve, in marble, nor transfer it to canvass, unless he have studied the subject, and for the time being transmuted himself, at least his mind, into the frame and mood similar to that which he is desirous of copying for the pleasure and admiration of others.

If we entertain any doubt on this point, we have but to watch the movements of a child whose body is not trammelled by tasteless dress, nor whose mind is weakened by fear. We shall see it, not only in its looks, that is, in the expression of its eye, and in the contraction of the various muscles of the face, by which it frowns, smiles, laughs, sorrows, and doubts, but also in its gestures and attitudes, indicate every passing emotion and active state of mind.

This necessary, natural, and obvious connection and co-relation between mind and motion or expression, which it ought to be one of the great purposes of education to preserve and to extend and strengthen, is by a series of strange and perverse efforts enfeebled and in a measure broken, to the detriment of the health and beauty both of the mind and of the body. These two are made subjects of different and often opposite culture and influences, in place of their acting in constant and pleasing harmony. Slight cognisance is taken of the strong instinctive mental wants and impulses of childhood, so clearly manifested in vocal utterance and active and varied locomotions and gestures. The only standard admitted is a purely conventional and arbitrary one; and to this the tones, language, and whole deportment of the little being are subjected. Mental gymnastics are overlooked in the training which is begun; the mind is forbidden its

customary manifestations: it is not addressed, is not cared for, provided the eye and ear of the parent be not offended by loud noises and boisterous movements. It is left to chafe and fret; and it does chafe and fret the more, because it is prevented from sending forth its wonted irradiations, its effluences, through the body. These take a different direction, and, in place of going to the limbs and voluntary muscles generally, they are pent in on the brain itself, or are directed to the heart and other internal organs, which become disordered in consequence. For, we may remark here incidentally, that unless there be a certain degree of exhaustion of the nervous power of the brain on the muscles, by the exercise of these latter, the individual suffers from what is vaguely called nervousness, a general agitation, unhappiness, a feeling of danger without known or admitted cause, wakefulness, &c.

The movements and exercises of the body, few in number and limited in range, which are substituted for the more decided and active manifestations of intellect and feeling of the child and youth, are performed imperfectly and with distaste, because they are not the direct result of full and energetic volition; but only of that weakened kind which comes from mere imitativeness. How far this faculty alone, or even a cold sense of duty will carry a person forward in the various accomplish-

ments, without other motives and faculties, is seen in the indifferent progress in music and drawing, for example, of thousands of young persons, who have not primarily a genius or even taste for these arts. Not less evident, if we direct our attention to the subject, are the failures in the acquisition of bodily strength, and of a display of a graceful and easy carriage, if the exercises of the mind and body be severed, and the former not allowed to call into play the mobile instruments of the latter.

Were beauty alone the subject of our study we should have to inquire into what is its standard, what the proportions of the several parts of the human body which constitute a beautiful form. We might, in advance, show the great differences both in the development and consequent proportion of the fixed or bony parts of the animal frame in the different races of mankind, as evinced in the configuration of the skull, of the cheek bones and chin, and of the actual and relative size of the chest and shoulders, and of the pelvis, and the straightness or gibbousness of the legs. For the most part, the color of the skin is that characteristic of race which most fixes the attention of the casual observer: but though marked, it is far from being so conclusive as the peculiarities just mentioned of the bony structure. Next to this are differences in the development of the brain and of the propor-

tion between this organ and the organs of the several senses.

But as my aim is to give practical instruction, and to exhibit evils and the means of their prevention and to a certain extent removal, it is not necessary that I should point out primary and natural peculiarities of form and feature, which cannot be altered or removed. There is undoubtedly, if not an absolute standard, in this respect, to which we would all gladly conform, certain general proportions, which, as they imply health and vigor, or ready and varied movements and adaptation of structure to function, are looked upon with satisfaction by nearly all mankind. We find, it is true, both amongst the savage and civilised nations, notable exceptions to the doctrine of unity, startling by their extravagance and irreconcilable with the commonest principles of taste and utility. Such, for instance, are the flat heads, or depressed foreheads among certain tribes on the north-west coast and among the Caribs of the West Indies; flat noses among some of the African tribes; small and deformed feet among the Chinese; black teeth amongst the Malays and others; and last and worst of all, if we consider the extent of the evils growing out of the fashion and the presumed knowledge, intelligence, and refinement of the people among whom it is practised; compression and

flattening of the chests in a majority of the women of Europe and North America, in civilised and Christianised Europe and North America!

In general, however, it will be conceded that the size and relative proportions and prominence of the several parts of the bony structure, viz: of the skull and face, the length of the limbs, and the size of their extremities, the hands and feet, and the stature of the individual, are innate and hereditary, though in part dependent on the attention subsequently paid to the laws of growth and exercise. They are nearly fixed and but little moulded by art or education. The extent of covering which the bones shall receive is, also, in part, fixed and determinate, as far as respects the number of the muscles which envelop them. In size, there are great modifications resulting from the activity of nutrition and from exercise, points to which I have already adverted. In the proportion of fatty and cellular tissues interposed between the muscles and distributed under the skin, the differences are also most manifest. Of this I have also taken notice in a former chapter. The color of the skin both in a particular race, and the shades of it in individuals of the white race are fixed from birth. The white, yellow, and black, are terms applied to designate the three great varieties of mankind, the Caucasian, the Mongolic, and the African. In our own race, there are, from birth, individual differences of

hue; as of fair and brown, on which together with the corresponding color of the hair and eyes, and a favorable style of features, is founded the division into blonde and brunette beauties.

Although we might see before us a being, who in stature, symmetry, and roundness of form, undulating lines in the trunk and limbs, and in the proportion of all the parts, and in the polish and clearness of skin, should be a model of beauty; and near this one, another with disproportioned features and limbs, and whose skin was more of the hue of the olive than of alabaster; yet, it may so happen that the first shall weary, and the second win attention and insure general favor. That which gives attraction to the latter, and the absence of which deprives the other of abiding interest, is *expression*, itself the evidence of a sentient and thinking being, and which impresses the spectator and raises his admiration, as a sentient and thinking being. Men may and do differ in their estimate of what shall constitute beauty. The fair ample forehead will be lauded by all; but the low and retreating one will not prevent admiration, any more than the short and upturned nose, the large mouth, and long chin, or too protuberant lip: the eye of hazel is that of the idolatry of one; the blue of another; the black of a third. In fine, whether the face be long or round or oval, the skin fair or brown, the stature high or low, of

Juno's or of Venus' height, there will be many to extol it; an evidence this of contrariety of opinion in the fixed and stable character of face and form. But in regard to expression there is no such difference. An easy and graceful carriage, a countenance beaming with intelligence and benignity are recognised and admired by all. The signals furnished by expression are appreciated by children and animals both wild and domestic. They indicate the disposition, the habitual feelings of the individual with more force and distinctness than the conventional language of vocal utterance; for they are the direct result of the operation of the mind on the body by means of the brain and nerves on the muscles, which last are at once the organs of motion and of expression. The absence of all expression implies, and is proof of the want of mind. But there is a composed state of the features indicative of tranquillity and of quiet thought and subdued emotions, which is a necessary accompaniment of beauty, and which will often be received as a substitute for the harmonious proportions deemed requisite to this latter. Just as there is, also, a play of the features which constitute the expression of benignant cheerfulness, short of animated good nature, which borders on grace and makes us forget the previous ugliness of their possessor.

The instruments of expression, in the face, are of the same class with those of expression in the rest of the body. They are voluntary muscles which, by their contraction under the stimulation of the mind, in a manner already explained, alter the size and figure of the apertures of the eyelids, nostrils, and mouth, and by their alternate and successive action give endless variety to the human countenance. They are less evident in woman from their being more covered and imbedded in cellular and fatty tissue than in man, and hence a softer expression in the former.

These muscles are, with few exceptions, connected to the bones by one extremity and to the softer and moveable parts by the other. By their contractions, frowning, scowling, smiling, are performed; and scorn, contempt, sorrow, pity, pride, humility, and a crowd of emotions and passions are indicated. But although always put in motion by the stimulant from the brain conducted to them along the nerves, they contract at times in states of the system in which the mind is, to a certain extent, passive; as when the individual suffers from violent bodily pain. Even here, we often see the controlling power of the mind, in its refusing to pass, as it were, to the muscles the painful impressions which the brain received from the suffering organ. Still, pain or any irritation of the body,

whether external or internal, by disturbing the mind will, also, more or less disturb the harmony of expression of the face.

The most expressive parts of the face, those to which the greatest number of its muscles tend, are between the eyebrows, at the external wings of the nostrils, and at the angles of the mouth. There is scarcely an emotion experienced, a change of expression however slight, which will not be evinced by some change caused by contraction of the muscles, or a slight tremor even, at one or other of these parts. As yet, the absurd and cruel intrusiveness of false fashion has not attempted to control or rather to destroy the movements of these muscles, as it has those of the chest and back and of many of the limbs; although there would be just as much wisdom, as respects grace displayed, in putting a piece of adhesive plaster across one angle of the mouth, or between the eyebrows, with a view of giving an improved appearance to these parts and adding to the expression of the features as there have been in corsets, girds, &c., to the back and breast.

They take a very limited and imperfect view of expression who regard it as confined to, and evinced in the face alone. The mind, the source of expression, sends, as I have repeatedly stated, its irradiations through all the voluntary muscles, which, by their movements become exponents of its inten-

tions and feelings. Consentaneous with the contraction of the muscles of the face, and consequent change of the features, under mental emotion, is that of the muscles of the trunk and limbs, by which attitudes and gestures are assumed, and of those at the opening of the windpipe, by which the modifications of voice, or intonations, are formed.

To the mind, then, and its proper cultivation should we look for for the source of appropriate, varied, and correct expression. But it must be a healthy mind by which we can obtain this desired result. Intellect alone will not give it; nor will all the aids of science and letters. In fact, the imprint on the face of nearly every individual, and the carriage and manner are made by the disposition, and the moral character. There is no look, nor walk, nor gestures, indicative of genius; but all these may become clear signs of pride and self confidence, firm resolve and ardor in pursuit of a favored object, or of diffidence, humility, and deference to the opinions of others.

Under the genial influence of a well disposed and well trained mind, which implies of necessity a healthy brain, the blood courses freely under the skin and imparts to its texture the desired color, fulness, and softness; the eye is lustrous; the features animated, and the muscles in that state of readiness, or mid-tension, which makes them fit

instruments for expressing the emotions of the speaker and for enabling her to persuade, charm, and sway by this natural language. Under this influence, the voluntary muscles concerned in speech are brought into action, with a distinctness and impressiveness which give weight to the opinions of the speaker; and from the same source comes the final and irresistible charm of the intonations of the voice, which seem at times to be the very vibrations of the feelings.

Commonly, the education of the mind is as unfavorable as that of the body to beauty. The laws of hygiene are perverted or entirely neglected in their application to ethical, as they are to physical training; and the consequence has been weakness and often deformity in both. "Do not frown so, my dear!" exclaims a fond mother to her daughter. The wrinkles are smoothed for a moment; but no attention being paid to the cause, they soon return. If the question had been asked, "what makes you frown, my dear?" or if the parent had asked herself, whence this look of discomfort, or of discontent in my child, which mars her good looks and may, if continued, become a fixed trait; she might set about detecting and perhaps remove the causes. There may be such a compression of the chest as prevents free breathing; or a fit of indigestion brought on by the same cause, or tight shoes, or some band, or ligature which interferes

with freedom of movement. Or the frowning look may be the effect of languor, from a want of exercise and fresh air, and of proper mental occupation.

Composure and placidity are necessary conditions for beauty of expression, even of the highest order, the intellectual. Their display presumes, of necessity, a mind at ease—a brain free from irritation either directly in itself by perturbing emotions, or indirectly by pain or disorder in any other organ. The brain, as the recipient of impressions made on any part of the body, promptly transmits the result of the sensations which follow to the voluntary muscles. If the sensation be unpleasant or painful, its nature is evinced in the language of complaint; or, this being restrained, in the play of the voluntary muscles, both of the face and of the body at large. By a strong mental effort or from habits of endurance, a very startling external manifestation may be prevented; but it will be impossible to assume the appearance of entire ease and tranquillity, and to give the face an expression correspondent with or indicative of this state, so long as the brain is irritated by pain or disturbance in any part of the body.

How little, therefore, can we expect to see the full charm or even quiet ease of expression, and frank and yet placid air in a young person of the other sex who is exposed to a torture enjoined by fashion, which, under other circumstances, would

be called the extreme of barbarity. We will suppose that her toilette is complete, and that she is arrayed agreeably to the requirements of fashion, and the implied sanction of her affectionate mother, her considerate teacher, and her pious pastor. Her hair, in place of falling in ringlets and curls, is parted on the middle of the head and drawn tight on either side and secured by combs; whilst the larger portion is twisted, also, tight, and secured on the top and back of her head. The skin covering the skull is stretched by these contrivances, and that of the face is prevented from following with freedom the movements of the muscles, in the different changes of features. These latter cannot be natural and pleasing under the feeling of the continued tension of the scalp by the overstretched hair. But this is only a small part of the sacrifice made at the shrine of folly. In order to exhibit a genteel if not a very thin waist, the chest, which, naturally, is more expanded below than it is above, is drawn in and compressed by corsets so as to convert this cavity from a conical to a cylindrical shape, with the effect of compressing the lungs and rendering it utterly impossible for the respiration to be free and easy. The process of breathing, which would be scarcely perceptible to another person, if all the organs concerned in it were allowed to perform their parts conjointly, is now labored and panting under the least exercise; and

not only are the heavings of the chest at the upper portion painfully manifest, but there is a spasmodic raising of the shoulders, in order to compensate as much as possible by a forced, unnatural, and unseemly expansion above for the compression and stricture of the lower part of the chest. The breathing of a young woman thus corseted and a little excited, either by exercise or emotion, is, in fact similar to that of a person suffering from pleurisy or from inflammation of the lungs. The appearance of the countenance is nearly the same in the two cases: the cheeks are preternaturally flushed and of dark red hue, which is not confined to them but is more or less diffused over the whole of the face. The lips and nostrils undergo occasional twitches, in consequence of the instinctive sympathy between the beginning of the respiratory tube at the mouth and nose and the lungs themselves. There is, also, perceptible to even a casual observer a contraction between the eyebrows, approaching to a frown, and which is, also, an instinctive movement of the muscles after any disorder or disturbance by which the brain is unpleasantly impressed, as it must be from the causes now in action. Receiving blood imperfectly elaborated, owing to the impeded respiration, the brain cannot perform its functions with readiness, even were it not disturbed by the painful causes just described; and the mind is in consequence crippled;

and its manifestations are constrained and artificial. The affected smile and forced laugh but illy conceal this discord of the features. To one who is not aware of the cause of the constrained air and carriage of a candidate, in full dress, for fashionable fame, the transformation, on the following morning, into a plainly attired personage, whose movements are natural and graceful, and the expression of whose countenance is cheerful and pleasant, must appear to be miraculous. The difference is explained by the removal in the latter period of the instruments of torture to which she had been subjected the evening before. An enumeration of the causes would be incomplete were we to omit tight shoes, which so often compel their wearer to fidgetiness and changes of place of her feet, even when she is seated, and greatly interfere with, if they do not entirely prevent, a free and graceful step and carriage when she is walking or dancing. As ranking among the causes of painful sensations, tight shoes, also, contribute their full share to disturb the quiet expression of the features, so essential to a character for beauty as well as for good nature. No candidate for admiration of her beauty, or for charm of expression or witchery of manner, would hope to be successful, she would forego indeed the attempt, if she were suffering from the irritation of tooth ache or of a whitlow; and yet, by a strange inconsistency, she will habitually, day after day,

and evening after evening, exhibit herself with compressed and of course deformed chest, hair twisted and stretched, and shoes pinching her feet; circumstances more disturbing to the desired expression of beauty and grace than a diseased nerve in her tooth or a pained finger.

It is hardly necessary to be more explicit by adducing more numerous facts to prove the position already advanced, viz: that deviation from health, in a disorder of any organ or tissue of the body, by disturbing the brain deranges more or less the harmony of expression, besides the impediments which it offers to nutrition, the formation, elaboration, and distribution of the blood; and the consequent injury to the color, fulness, and roundness of the forms in the different regions of the body and limbs.

Poor is the substitute offered by the professed teacher of the graces for the expression of face and carriage of a person whose mind is pleasingly and healthfully occupied. The affected smile, the measured step, the stiff and erect attitude when seated, are so many positive and violent inroads upon beauty, because they are destructive of grace. No proportional differences in the size of the body and limbs of individuals are admitted any more than in the character of their minds. The waist must be made small at all hazards; the feet pinched into a shoe half the proper size, and the arms

tied down to the sides by the shoulder-bands of the frock. Of course, the light and springy step, the gentle flexion of the body, and the easy play of the hands and arms, so essential to, and indicative of true grace, and without which, beauty is cold as a statue, cannot be executed. The muscles of the face sympathise with the suffering muscles of the trunk and limbs, and they act irregularly and unequally, and either destroy entirely the beauty of countenance or greatly diminish its attractiveness.

Not only the hands, but the feet too, should be allowed, without contraction or cramp, to join in action with the head; a thing impossible if they are squeezed, as by a vice, into disproportionately tight shoes. For a person so punished to walk with ease is not to be expected; to walk with lightness and grace is impossible.

The cause of beauty not less than that of health and of sound ethics, requires that the mind and the body should be left to exert, untrammelled, a reciprocal influence; the one aiding and giving vigor to the other. Guidance but not coercion, protection but not imprisonment, are the requirements for a suitable education; in which it is not enough to repress what is injurious, but we must also nurture and aid the development of the beautiful, the fair, and the good. One of the first, as it is a continued craving of every animated

being, is exercise, which, in all the lower orders of animals is safely taken in conformity with the calls of instinct; and which no fiction of reason ought to cause to be withheld in the human species. In animals, no movements which they make of themselves are awkward; many are absolutely graceful, because free and natural, though with specific purpose and intent. If the members of the human family were allowed the same unrestricted use of their muscles which the animals below them enjoy, together with the added and peculiar and distinctive advantages of proper mental culture, expression would give dignity to wisdom, and grace and charm to beauty, and render even ugliness a matter of speculation rather than of positive perception and knowledge. In the light and easy step and carriage we would cease to regard with much scrutiny the size of the foot and turn of the ancle. In the movements and attitudes of the body generally when it is covered with a light and flowing drapery, adapted in a degree to its undulations of outline, we would gladly forget slight differences in the size of the waist; certainly would never wish to see it reduced to the shape of a mere cylinder; and the dress made in imitation of certain figures in geometry, in straight lines and angles, to the exclusion of the waving line of beauty.

The advice given to the painter ought to guide woman in the arrangement of her dress.

“Free o’er the limbs the flowing vesture cast,
The light broad folds with grace majestic plac’d,
And as each figure turns a different way,
Give the large plaits their corresponding play;
Yet devious oft, and swelling from the part,
The flowing robe with ease should seem to start,
Not on the form in stiff adhesion laid,
But well relieved by gentle light and shade.”

The necessary harmony between the expression of the face and that of the body generally is inculcated on the artist who would picture beauty. Is its observance less necessary in real life?

“Nor can such forms with force or beauty shine,
Save when the head and hands in action join.
Each air constrained and forced, each gesture rude,
Whate’er contracts or cramps the attitude,
With scorn discard.”

The Romans, it is known, did not allow the manly robe to be put on, until the youth had reached a certain age, and was prepared to perform the duties required from a useful citizen of the state. With us, a different practice prevails, and we are eager to invest even children with the garments and garnitures of adult folly. Could we not take a hint from the Romans, by refraining to

impose the bands and badges of fashion on minors and those of tender age, and wait until, of their own accord, at least, they should enrol themselves in the same list with their fantastically attired seniors.

Let us, in mercy, not deprive childhood of its gambols nor youth of its sports, by pinioning their bodies with tasteless garments insufficient even to protect them from the inclemencies of the season.* Let us rather allow them to yield to those instinctive calls for exercise, by which their frames grow and are strengthened and their limbs gain that development of form and the free and varied movements which fit them, in after life, for a display of agility and an easy carriage and deport-

* Mothers ought to be made aware of an important truth which most physicians are backward to inculcate. It is, that the young of all animals have less bodily heat and require more protection from external cold than adults. The application of this truth should work sundry reforms in the dress of children by giving their breasts and shoulders that covering of which they are so often deprived, in order that they may be dressed in the fashion. The mother's vanity is gratified by dressing her child in the latest fashion; and in return the child has catarrh, or croup, or inflammation of the lungs, which often prove fatal; or, escaping these, its health is undermined by the progress of scrofula, evinced in glandular swellings on the neck, dry scurfy skin, &c.

ment. The body divested of girths and bands and casements, and clothed in loose vestments, will obey the suggestions of the mind and assume the postures and attitudes conformable with the dictates of grace, and indicative, at the same time, of health and well being.

The cause of health, of beauty, of education, and of humanity even, requires that we should study the human body, with its proportions, outlines, and inflections, its powers of movement and expression. The remark of the celebrated Canova, when comparing ancient and modern art, respecting attention to drapery, is strictly applicable to the antique and modern fashions of attire. The ancient artists, said he, threw all their energies into an endeavor to make the countenance and attitude expressive, with but little regard to the dress; whereas, the moderns place all their skill in the expression and movement as it were of the garments. Hence the different impressions on the mind of the spectator. The figure in the former case is all speaking; the dress is silent. In the latter, the clothes are all eloquent, or arrogant rather; and the figures cold and expressionless as the unquarried marble itself.

THE END.

